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ESOPHAGEAL TUBERCULOSIS; A CRITICAL REVIEW.*

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A thorough review of the literature of esophageal tuberculosis shows that the frequency of this condition has been somewhat underestimated, although it proves that no other organ is so seldom affected by tuberculosis.

Until the perfection of the present instruments of precise examination, study of the disease was limited to autopsy-findings; hence its discussion was of purely academic interest. To-day, when the condition is capable of clinical observation, a new interest attaches that warrants more thorough investigation.

Tuberculous ulceration of the esophagus, regardless of locale or extent, rarely produces distinct subjective symptoms, and seldom occurs until late in the course of pulmonary, intestinal, and laryngeal disease, when such symptoms as might otherwise be evident are completely masked by those attending these earlier and graver localizations. In only a few cases has this pathological condition dominated; hence our knowledge is based almost entirely upon the lesions discovered at autopsy.

The first case was recorded by Denonvilliers[1] in 1837, and six years later, Louis[2] reported finding six cases of esophageal ulceration, presumably of a tuberculous nature, in 120 tuberculous cadavers. As late, however, as 1877, Zenker[22] wrote: "Whether tuberculosis and tuberculous ulcers occur in the esophagus is not yet definitely proved."

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In the seventy-four years that have elapsed since this first observation, 103 cases have been recorded; of these fourteen cannot be analyzed; to twenty doubt attaches owing to the lack of histological or other confirmatory proof; and sixty-nine can, with reasonable certainty, be classed as tuberculosis.

Of the twenty doubtful cases, thirteen concerned patients in whom the esophagus became perforated as a result of tuberculosis of contiguous structures, without, however, producing lesions of a proved tuberculous character in the esophageal mucosa itself.

The rarity with which the esophagus succumbs to the tubercle baclli is best shown by its comparison with other important organs:

Esophagus involved 25 times in 16,489 autopsies on tuberculous cadavers. Stomach involved 62 times in 13,500 autopsies on tuberculous cadavers. Uro-genital system involved 1,105 times in 7,501 autopsies on tuberculous cadavers. Kidneys alone involved 321 times in 2,237 autopsies on tuberculous cadavers. Heart and pericardium involved 73 times in 3,017 autopsies on tuberculous cadavers. Liver involved 321 times in 2,858 autopsies on tuberculous cadavers. Spleen in volved 333 times in 3,471 autopsies on tuberculous cadavers. Pancreas involved 6 times in 3,131 autopsies on tuberculous cadavers. Bones involved 32 times in 1,085 autopsies on tuberculous cadavers. Intestines, peritoneum and retro-peritoneal glands involved 1,567 times in 21,484 autopsies on tuberculous cadavers. Brain involved 17 times in 3,131 autopsies on tuberculous cadavers. Meninges involved 145 times in 5,578 autopsies on tuberculous cadavers. Adrenals involved 33 times in 2,471 autopsies on tuberculous cadavers. Appendix involved 98 times in 1,340 autopsies on tuberculous cadavers. Pharynx involved 187 times in 11,189 tuberculous patients. Larynx involved 2,003 times in 14,980 tuberculous patients. Nose involved 46 times in 7,941 tuberculous patients. Ear involved 66 times in 1,135 tuberculous patients. Tonsils involved 240 times in 2,979 tuberculous patients. Tongue involved 13 times in 1,140 tuberculous patients. Skin involved 536 times in 123,746 cases examined. Meninges involved 3,509 times in 187,055 cases examined.

In these statistics a duplication may have occurred in certain instances, as in the reports of some writers the names of those reporting have not been given.

The autopsy reports upon the esophagus are from the following observers: Voelcker, 5 times in 2,504 cadavers. Willigk, 1 time in 1,317 cadavers. Sanger, 3 times in 1,226 cadavers. Zemann 3 times in 100 cadavers. Louis, 6 times in 120 cadavers. Frerichs, 1

time in 30 acute cases. Frerichs, 1 time in 205 chronic cases. Wiederhofer, no times in 875 chronic cases. Hecker, no times in 1,200 chronic cases. Caselmann, 5 times in 8,912 chronic cases.

That the esophagus possesses a high degree of immunity is attested by the infrequency of its involment, despite the fact that it is constantly exposed to direct infection by the food and sputum. This immunity can be ascribed to several factors, anatomical and physiological:

Probably the most potent protection is that afforded by the conformation of the tube, both minute and gross. To the entrance of the bacilli is opposed a perpendicular tube of fairly uniform caliber, without points of sudden shelving (although the mucosa is thrown into longitudinal folds and there are a number of points, about thirteen, of greater or less constriction) and lined by a well developed layer of stratified squamas epithelium, a tissue everywhere resistant to the invasion of tubercle bacilli.

A second reason for the rarity of involvement is to be found in the rapidity with which deglutition occurs, the masses of food or sputum, usually well enveloped by mucous and saliva, being forced downward so rapidly that any contained organisms find slight opportunity for lodgement. Moreover, their retention is made difficult by the frequent movements to which the tube is subjected and its frequent flushing by fluids. This immunity is also possessed by animals.

In those instances in which infection has occurred through the sputum, it has, almost without exception, been in individuals in whom the esophagus was predisposed through traumatism or disease, or greatly reduced in vitality through the cachexia induced by advanced tuberculosis of the lungs, intestines, larynx, and other organs.

Thirty-two cases of probable sputal infection have been recorded: of these four were associated with cancer of the same tissues; six followed the ingestion of acids or the development of thrush fungus; and twenty-two occurred independent of other disease. Eleven of these twenty-two had intestinal tuberculosis, and all had advanced disease of the lungs, usually complicated by other organic involvement.

Primary esophageal tuberculosis has not yet been observed, although there is strong grounds for the belief that the first infection of the body, in some cases of glandular tuberculosis, occurs by way of the esophagus. S. G. Shattock, in 1902, exhibited before the London Pathological Society the esophagus of a python that showed a

No.	AUTHOR.	Cases	1st Class	2nd Class	3rd Class	4th Class	5th Class	6th Class	7th Class	8th Class	YEAR.	PUBLICATION.
1	Denonvilliers	1							1		1837	*Bull. Soc. Anat.*, Paris.
2	Louis	6									1843	Recherches anatomiques pathologiques.
3	Oppolzer	1									1851	*Wien. med Wchnschr.*, Nos. 5 and 6.
4	Barth	1							1		1853	*Bull. Soc. Anat.*, Paris.
5	Willigk	1									1856	*Prag. Vierteljahrschr.*, vol. 13, 2-3.
6	Uhde	2						2			1856	*Deut. Klinik.*, Nr. 3, p. 33.
7	Chvostek	1			1						1868	*Oester. Ztschr. f. Heilkunde.*
8	Paulicki	1			1						1868	*Virchow's Arch.*, Bd. 44.
9	Loeschner	1						1			1868	Aus den Franz. Joseph's Kinderspital. Virchow's Jahresbericht, 1868, vol. 2, 643.
10	Breus	1	1								1878	*Wien. med. Wchnschr.*, p. 258.
11	Spillmann	1			1						1878	De la tuberculisation de tube digestif., Paris.
12	Sanger	3									1879	Leipzig Pat. Institute. Heinze.
13	Gruenewald	1							1		1880	Esophageschwur der Speisroehre. Erlangen.
14	Eppinger	1	1								1881	*Prag. med. Wchnschr.*, 51.
15	Penzoldt	3						3			1881	*Virchow's Archives*, Bd. 86, p. 448.
16	Frerichs	1			1						1882	Beitraege zur Lehre von der Tuberk, p. 96.
17	Beck	2				1			1		1884	*Prag. med. Wchnschr.*, Nr. 35.
18	Kundrat	1	1								1884	London Path. Soc. Trans., Vol. 36.
19	Weichselbaum	1							1		1884	*Wien. med. Wchnschr.*, 5-6.
20	Zelenkoff	1							1		1884	*Petersburger med. Wchnschr.*, 491.
21	Polandt	1							1		1885	Trans. London Path. Soc., Vol. 36.
22	Mazzotti)	3			9		2		1		1885	*Rivista clinica di Bologna*, Jan.
	")	9									1896	Dal. *Bulletino di Scienze med. di Bologna*, Vol. 7, p. 553.
23	Barry	1							1		1885	*Med. News.* Phila., p. 236.
24	Zemann	3									1886	*Wien. med. Wchnschr.*
25	Pitt	1							1		1887-88	Trans. London Path. Soc., Vol. 39, 107.
26	Birch-Hirschfeld	1				1					1887	Lehrbuch der Path. Anat., Vol. 2, p. 518.
27	Hanot	1							1		1887	A de med. general., Sept., p. 352.
28	Ortn	3				1			2		1887	Lehrbuch des Spez. Path. u Ther.
29	Volcker	5			1				4		1890	Trans. London Path. Soc., Vol. 42.
30	Nowak	1							1		1890	*Muench. med. Wchnschr.*, Nr. 18.
31	Zenker)	1		1					2		1891	*Deut. Arch. f. klin. med.*, Vol. 47, 191.
	")	2									1895	*Ibid.*, Vol. 55, p. 405.

No.	AUTHOR.	Cases	1st Class	2nd Class	3rd Class	4th Class	5th Class	6th Class	7th Class	8th Class	YEAR.	PUBLICATION.
32	Cordua	1		1							1893	Arbeiten aus den. path. Institute Gottingen, 147.
33	Letulle	2							2		1893	*Bull. Soc. Anat. de Paris*, Vol. 68, p. 246.
34	Flexner	1			1						1893-4	*Bull. Johns Hopkins Hospital*, Vol. 4.
35	Bauer	1			1						1894	1 Versammlung Suedeutschen Larying., Heidelberg.
36	Hasselmann	1			1						1895	Ueber Tuberk. des. Esoph., Bern.
37	Frankel	1			1						1896	*Muench. med. Wchnschr.*, Vol. 43, p. 27.
38	Glockner	1					1				1896	Prag. med. Wchnschr., Vol. 31.
39	Danel	1							1		1896	*Jour. des. sci. med. de Lille*, Vol. 19, p. 520.
40	Pepper-Edsall	1		1							1897	*Am. Jour. med. Sci.*, Vol. 14, p. 44.
41	Cone	1					1				1897	*Bull. Johns Hopkins Hosp.*, November.
42	Bartlett	2							2		1899	*Ann. Otol., Rhin. and Laryngol.*, Vol. 8.
43	Weyeneth	1		1							1900	Inaugural Dissert., Zurich.
44	Zerenin	1								1	1900-01	Trudi Obsh. *Russk. Vrach.*, Vol. 40, No. 1, p. 131.
45	Kraus	1	1								1902	Nothnagel's Spez. Path. u. Ther., Vol. 16, p. 214.
46	Schilling	2							2		1902	Festschr. des Aerztlichen Vereins, Nueremberg.
47	Shrubsall-Mullings	1			1						1902-03	Trans. London Path. Soc.
48	Noder	1				1					1903	Ueber Tuberk. des Esoph., Muenchen.
49	Lalague	1							1		1903	De la tuberc. de l'esophage. These Bordeaux.
50	Meyerhoff	1							1		1903	Cited by Busch., Wuerzburg.
51	Riviere	3							3		1903	*Brit. Med. Jour.*, Vol 1, p. 193.
52	Rocher	1	1								1904	*Jour. de med. de Bordeaux*, Vol. 34, p. 649.
53	Kauffmann	1						1			1904	*Bull. et mem. Soc. Anat. de Paris*, Vol. 79, p. 544.
54	Caselmann	1				1					1905	Sekundare Esoph. tuberk, Erlangen.
55	Starck	1					1				1905	*Ziegler's Beitraege*, p. 723.
56	Evert	1	1								1906	Tuberkulose des Esoph., Bern.
57	Kuemmel	1			1						1906	*Muenchener med. Wchnschr.*, Vol. 53, p. 453.
58	V. Scrotter	1					1				1906	Brauer's Beitraege zur Klinik der Tuberk., Vol 6, p.3.
59	Moure-Viel	1								1	1909	*Rev. hebd. de Laryngol.*, Vol. 2.
60	Lockard	1				1					1909	Tuberculosis of the Nose and Throat.
61	Guisez-Abrand	2			1				1		1909	*Rev. de Chir.*, Paris, Vol. 7.
62	Staehelin-Burckhardt	2			1		1				1910	*Arch. f. Verdauungskrankh.*, Vol. 16, No. 4.
63	Penrose	1							1			Cited by Voelcker.
64	Londe	1							1			Cited by Letulle.
		103	6	4	22	6	7	7	35	2		

primary tuberculous infection; Shattock claimed that the infection had occurred by invasion between the cells of the epithelium which remained intact without any ulceration.

A probable reason for immunity to primary infection is the absence, in the human esophagus, of any considerable aggregations of lymphatic tissue—tissue which is present in considerable amount in the python's esophagus, and which is peculiarly susceptible to tuberculous infection. There are, however, small masses of lymph tissue in the human esophagus: toward the lower end there are distinct nodules of small size, and above there are small, diffuse areas of infiltration around the ducts of the mucous glands.

In a case of acute miliary tuberculosis reported by Cone, the esophageal foci were limited to these lymph follicles in the lower two-thirds of the tube, the only case of this kind on record. This form might easily be overlooked owing to the insignificance of these structures, as only a microscopical examination would reveal their presence.

A thorough review of the literature, including such cases as those of Louis, Chvostek, Paulicki, Willigk, Kraus, Penzoldt, and Zenker, which, while probably tuberculous, have not the sanction of histological demonstration, and those of Polandt, Barry, Hanot, Nowak, Penrose, Voelcker and Riviere, which had perforations of the esophagus in consequence of tuberculosis of contiguous structures, without, however, showing proved tuberculosis of the esophageal mucosa, reveals the following 103 cases, of which eighty-nine have been analyzed.

These cases, according to the channels of infection, have been classified as follows: 1. Direct inoculation of tissues predisposed through traumatism. 2. Tuberculosis and cancer. 3. Direct inoculation without previous injury. 4. Extension from the larynx and pharynx. 5. Hematogenous infection. 6. Lesions dependent upon caries of the vertebrae. 7. Extension by continuity from caseous glands. 8. Unclassified: cases in which the channel of infection cannot be definitely traced.

I. SPUTAL INOCULATION OF TISSUES PREDISPOSED THROUGH INJURY.

In this group six cases are recorded: those of Breus,[10] Eppinger,[14] Kraus,[45] Evert,[56] Kundrat[18] and Rocher.[52]

Breus's case concerned a consumptive of 21 years who swallowed caustic potash and in consequence developed a stricture of the esophagus. The autopsy revealed numerous cicatrices and ulcers in the esophagus, pharynx, and stomach. The ulcers showed miliary and caseous tubercles. There was tuberculosis of the lungs, lymph glands, kidneys, spleen, and intestines.

In the case reported by Eppinger, a woman aged 45, there was stricture of the esophagus due to the thrush fungus. At the autopsy the fungus masses were removed showing the underlying mucosa occupied by numerous tuberculous ulcers. The thrush was likewise present in the trachea and there was advanced tuberculosis of the lungs. Eppinger believed that the tuberculous infection depended upon the previous invasion of the oidium saccharomyces.

A similar case was observed by Kraus in which the middle third of the esophagus was covered with thrush and occupied by a large tuberculous ulcer, 1½ cm. in diameter. The patient seen by Evert had had tuberculosis for ten years when he attempted suicide by drinking muriatic acid. A month later he expelled a large tube-like piece of membrane covered with pus and blood, and twelve weeks later died in convulsions. Autopsy findings were: Tuberculosis of both apices; widespread scarring of the esophageal mucosa; ulceration and tubercles containing tubercle bacilli.

Kundrat's case was of a similar nature, the tuberculous infection occurring upon a mucosa previously destroyed by sulphuric acid.

Rocher's patient was a girl, 12 years of age, who, one month after drinking a solution of potassium, developed symptoms of stricture. Gradual dilatation was practiced. Hemoptysis occurred after eight months, followed by cough and cachexia, with death from tuberculous broncho-pneumonia.

Autopsy: Broncho-pneumonia; cavity in left apex; pleural adhesions; esophagus surrounded by enlarged non-caseous glands; stricture at the middle of broncho-diaphragmatic segment; walls 6 mm. thick; hour-glass shape; no dilatation above but mucosa extensively ulcerated.

Rocher's conclusions were: First stage: Esophagitis from caustic. Second stage: Debility from want of nutrition, leading to pulmonary tuberculosis. Third stage: Swallowing of sputum, transplanting bacilli upon already altered mucous membrane.

2. CASES IN WHICH THE ESOPHAGUS WAS COINCIDENTLY AFFECTED BY CANCER.

It includes the cases of K. Zenker,[31] Cordua,[32] Edsall and Pepper,[40] and Weyeneth.[43] In Zenker's case there was a stricture of the tube due to an ulcer that involved the entire circumference, which, on microscopic examination, proved to be a squamous epithelioma. It extended from the mucosa into the muscular layer. In the borders of the cancerous tissue were found typical tubercles some of which had undergone caseation. The neighboring lymph glands were involved by both diseases. Tubercle bacilli were found in the tubercles.

A somewhat similar case, in a man, 60 years of age, was described by Cordua. The entire lumen of the tube, on a level with the bifurcation of the trachea, was invaded by cancerous tissue, in the center of which and about the periphery were typical tubercles containing giant cells. From the center of the mass an opening extended into the peri-esophageal tissues but not into the trachea.

Pepper and Edsall found combined cancer and tuberculosis in the esophagus of a man of 42, who had suffered a long time from pulmonary and laryngeal tuberculosis. The entire tube, above the level of the arch of the aorta, was occluded, and the walls were converted into a dense mass of fibrous tissue, adherent to the vertebrae. In this fibrous mass they found cancerous tissue, as well as tubercles, giant cells, and tubercle bacilli. Pepper and Edsall believed that the first cause was tuberculosis, owing to the fact that the central and deeper portions of the tumor were composed of fibrous tissue.

The last case of the series is that described by Weyeneth and concerns a man of 58, who had had pulmonary tuberculosis for five years; for four years suppuration and deafness of left ear; later involvement of right ear. At time of examination there had recently developed difficult deglutition, and vomiting after eating. A sound was passed into the stomach without meeting an obstruction. After three weeks death occurred. The cause was given as "Tuberculosis pulmonum et intestini."

The autopsy showed tuberculosis of both lungs and several ulcers in the neighborhood of the ileo-cecal valve. On the anterior wall of the esophagus, on a level with the bifurcation, was an oval ulcer that macroscopically gave the impression of an ulcerated tumor. Surrounding the ulcer was an area over which the mucosa was destroyed. Scattered throughout this denuded area were numerous small nodules, both isolated and grouped. Granulation tissue covered the base of the ulcer, and the esophageal wall in the neighborhood of the ulcer was thickened.

Microscopically the chief mass was found to be composed of cancer tissue with recent tuberculosis (bacilli were found in the surrounding nodules) about the periphery.

In this case the sequence was: tuberculosis of the lungs and intestines; carcinoma of the esophagus; tuberculosis of the esophagus. Weyeneth's opinion, concurred in by Professor Ribbert, was that the malignant growth antedated by several months the tuberculous invasion. Infection by the sputum seems probable as there were no foci in the neighboring lymph glands.

Tuberculosis of the lungs is very common in cases of cancer, wherever located; so it is not remarkable that it should also occur in the tissues directly affected by the growth. It is claimed that although the condition induced by cancer tends to the invasion of the body by the tubercle bacilli, it is inimical to the spread of the disease, and that, therefore, pulmonary tuberculosis is rarely found in an active state, and is almost always retrogressive. The last case cited does not support this supposition.

3. DIRECT INOCULATION BY SPUTUM, WITHOUT PREVIOUS INJURY. Sputal infection of the intact esophageal mucosa has been considered extremely rare but I have been able to collect twenty-two cases that may be so classified. Owing, however, to the frequent co-existence of ulcers and nodules, it is not always possible to positively determine whether the infection is of sputal or hematogenous origin.

In this group are the cases reported by Spillman,[11] Mazzotti (nine cases),[22] Frankel, [37] Voelcker,[29] Hasselmann,[36] Chvosteck,[7] Bauer,[35] Paulicki,[8] Kuemmel,[57] Shrubsall and Mullings,[47] Staehelin-Burckhardt,[62] Frerichs,[16] Flexner,[34] and one of Guisez and Abrand's.[61]

In Spillman's case there was a small perforation leading from the center of an ulcer which occupied the middle of the tube, into the left bronchus. There was pleural tuberculosis and enlarged bronchial glands. This case, in which there had been symptoms of stricture, was one of two recorded in which a tubercular ulcer originating in the esophagus perforated the walls. The other case was reported by Flexner. Of the twelve cases seen by Mazzotti, at least nine belong in this group:

Case 1: Mazzotti's first case was a man of 39 years with advanced tuberculosis of the lungs and intestines. In the lower portion of the esophagus were numerous tubercles, some of which were ulcerated.

Case 2: The second case was a woman of 33. The entire esophageal mucosa was hyperemic, the cardiac end being the more injected. Scattered throughout this inflamed area were numerous ulcers, tubercular in nature. Near the cardiac orifice was a very large, irregular ulcer, produced by the coalescence of a number of smaller ones. Death was due to pulmonary tuberculosis.

Case 3: His next case concerns a man of 40 years, who died of pulmonary tuberculosis. For two months before death he had experienced a sensation of burning on deglutition. At the upper orifice of the esophagus were several small, broken-down tubercles, and beneath these, in the middle and lower thirds, two isolated ulcers of comparatively large size.

Case 4: The fourth case was a woman of 35 years, who, in addition to pulmonary tuberculosis, had rather extensive involvement of the esophagus, the ulcers extending throughout the middle and inferior thirds.

Case 5: In another case, a man 60 years of age, the lower half of the esophagus contained about thirty elliptical ulcers that increased in size as they approached the cardiac orifice. Death was occasioned by advanced pulmonary and intestinal tuberculosis.

Case 6: This case, a young man of 18 years, presented conditions which were similar to those of Case 4.

Case 7: A man, 67 years of age, who had pulmonary and intestinal tuberculosis, was found, on autopsy, to have numerous ulcers in the upper part of the esophagus, and a traction diverticulum as large as the end of the little finger at the junction of the middle and lower third. The mucosa, between the diverticulum and ulcers, was dotted with numerous tubercles.

Case 8: The eighth case was a woman, age 48, who also had intestinal and pulmonary tuberculosis. In the midst of an intensely congested area in the lower two-thirds of the esophagus was a mass of ulcers, about 15 in number, superficial and small, with one exception.

Case 9: The last of Mazzotti's cases to fall in this group was that of a man of 61 years. The upper part of the esophagus contained four or five ulcers, and there was chronic tuberculosis of the lungs. Tubercle bacilli were found in all of Mazzotti's cases.

Frankel describes the case of a man, 33 years old, who died of intestinal and pulmonary tuberculosis. The esophagus was the seat of a large number of small, yellowish nodules, some of which were ulcerated, and of several round ulcers. Tubercle bacilli were found. Frankel could not determine whether he had to deal with a hematogenous infection or one due to the sputum.

Voelcker's case, one of the five described by him, concerned a child of 5 years, who upon post-mortem examination, showed an oval ulcer, three-fourths of an inch long, on the anterior wall of the esophagus at the level of the bifurcation of the trachea. Voelcker says "The muscular coat remains, the floor is smooth as if healed, although in the neighborhood of a caseating gland. The ulceration, as far as could be seen, had not started from or been in any way caused by the gland."

Hasselmann's report deals with an infant boy, 6 months old, in whom there were lesions in the esophagus, both lungs, the intestines, and the bronchial and mesentric glands. In the lower part of the

esophagus were two deep ulcers, the lowermost lying immediately above the cardia. Microscopic examination proved them to be tuberculous.

The cases reported by Chvostek and Paulicki have been rejected by various writers owing to a failure of histological confirmation, but were probably tuberculous. The former observed a patient, 43 years of age, who, for several weeks preceding death, complained of some difficulty in swallowing. At autopsy he found numerous round and oval ulcers in the lower portion of the esophagus. Surrounding the ulcers were numerous yellowish-white nodules from some of which a pus-like fluid could be expressed. Paulicki's case was an old man of 74 who had suffered from difficult deglutition, and whose esophagus contained a stricture on a level with the cricoid cartilage. A large ulcer was found on the posterior wall and a smaller one beneath and to one side of this.

One of the few cases in which a clinical diagnosis has been made was exhibited by Bauer and later reported by K. Zenker. The sound revealed an obstruction 22 cm. from the teeth. There was extreme dysphagia. On a level with the cricoid cartilage the esophagus had been girdled by an ulcer leading to partial stenosis. Tuberculosis was proved by histological examination, and there was in addition tuberculosis of both lungs. The larynx was free. Diagnosis had been made by exclusion. This case is practically identical with the one described by Paulicki.

In a man, dead of tuberculosis of the lungs, trachea, and intestines, Shrubsall and Mullings found a large, tuberculous ulcer, that involved almost the entire circumference of the esophagus. There had been no symptoms referable to this organ.

In Kuemmel's case also there had been an entire lack of subjective symptoms although the esophagus was the seat of a large ulcer, 13 cm. long, that occupied the entire width of the tube. The lungs were extensively involved, and there was tuberculosis of the intestines, larynx, prostate, and peri-bronchial glands.

Another case of this nature is that recorded by Staehelin-Burckhardt, and concerns a man 60 years of age, who was admitted to the hospital with a diagnosis of pulmonary emphysema and chronic bronchitis. There was no history of difficult deglutition. Death occurred within a few hours and the autopsy disclosed a large ulcer beneath a group of miliary tubercles, the affected area lying 5.5 cm. below the base of the cricoid. Somewhat below the ulcer, in the middle line, was a typical traction diverticulum. Tubercle bacilli were found in the ulcer, and there was tuberculosis of both lungs and of the intestines.

Frerichs observed a girl of 8 years who had tuberculosis of the lungs, pharynx, kidneys, intestines and esophagus. In the esophagus, in the lower third, were several tuberculous ulcers surrounded by nodules.

The case recorded by Flexner is the second one in which an ulcer originating in the esophagus perforated the walls. In this instance the perforation was into the left pleural cavity, in Spillmann's, into the left bronchus.

The autopsy report as given by Flexner, follows: "For a distance of 4.5 cm. the esophagus lies freely exposed in the left pleural cavity. At a point 2.5 cm. above the arch of the aorta, where the left common carotid is given off, there is a perforation leading directly into the lumen of the esophagus. The tissues surrounding the esophagus are edematous and hyperemic, and a considerable loss of substance has occurred in the connective tissue covering it. For a space of 4x2 cm. the connective-tissue sheath is entirely wanting, or very thin. On section of the esophagus there are, in the anterior wall but somewhat to the left of the middle line, two ulcers, measuring 7.5x4 mm. The more superficial one reaches the muscular coat but does not penetrate beyond, while the other has perforated the esophagus and communicates by a small opening with the left pleural cavity."

The subject was a woman, 33 years old, who had tuberculosis of the lungs, pleura, intestines, and the cervical and bronchial glands, as well as of the pyo-pneumo-thorax. Flexner did not believe the tuberculous pleurisy was a result of the perforation.

The case observed by Guisez and Abrand is particularly interesting in that it was subjected to exact clinical study, and the results of treatment could be accurately observed: A man of 34, who gave no history of syphilis, had been ill for one year with progressive anemia, accompanied by severe cough and expectoration. For the previous month he had had some dysphagia, which suddenly, during the course of a meal, became so severe as to lead to the belief that a foreign body had lodged in the gullet. The pain disappeared and reappeared at intervals, and finally became permanent. An ulcer, grayish in color, and surrounded by a pale mucosa, 1½ cm. long by ½ to 1 cm. wide, was located 20 cm. from the dental arch. The dilatation, occasioned by the esophagoscopy, relieved the dysphagia, and was repeated fifteen days later. The patient had improved both in weight and appearance. At the second treatment the ulcer was touched with 50 per cent lactic acid, and dilatation did not occasion pain. Three treatments were given with great re-

lief, but death occurred from the pulmonary process one month after the beginning of treatment.

Guisez and Abrand class this case as one due either to emboli by lymph or blood stream, or to a direct primary infection. As there was pulmonary disease, accompanied by copious expectoration, the assumption is warranted that the esophageal lesion was a result of sputal infection.

4. DIRECT EXTENSION FROM THE PHARYNX AND LARYNX: In this group can be placed the cases of Beck,[37] Birch-Hirschfeld,[26] Orth,[28] Noder,[48] Caselmann,[54] and the author.[60] In Beck's case, a man of 54, there was extensive ulceration of the lower pharynx, the base of the tongue, and the upper esophagus in its entire circumference. For three months before death the patient had had difficulty in swallowing.

Direct extension into the esophagus from the larynx and pharynx was seen by Birch-Hirschfeld, and from the pharynx by Orth. Noder described a case in which extension occurred from lesions in the lower pharynx and recessus pyriformis, and Caselmann one in which the upper aperture of the larynx, including the epiglottis and the upper esophagus, was involved by ulceration.

The specimen examined by the author was from a patient of 38 years, in whom the presence of such a focus had been unsuspected. Such symptoms as might otherwise have been noticeable were completely masked by the severe dysphagia attending the laryngeal lesions. Both arytenoid cartilages, the aryteno-epiglottidean folds, and the epiglottis were extensively infiltrated and ulcerated, and the upper third of the esophagus was the site of three groups of ulcers.

The uppermost group was in direct connection with the ulcers at the laryngeal orifice; the middle group, consisting of four small ulcers, was opposite the cricoid cartilage; the lowermost, consisting of one large ulcer in the center, and one small erosion toward the left lateral wall, was nearly on a level with the bifurcation of the trachea. There was extensive involvement of the lungs and intestines.

5. HEMATOGENOUS INFECTION: This group includes the cases of Cone,[41] Glockner,[38] Mazzotti,[22] V. Schrotter,[58] Staehelin-Burckhardt,[62] and Starck.[55] Frankel's case, sometimes considered to be of hematogenous origin, has been here classified in division III.

The anatomical diagnosis in Cone's case, a negro, aged 33 years, was as follows: "Removal of testicle (for tuberculosis) eighteen months previously: tuberculosis of epididymis and remaining testicle, seminal vesicles and prostate gland; generalized tuberculosis;

chronic tuberculosis of the lungs; peculiar nodular forms of tuberculosis of spleen and kidneys; tuberculosis of adrenal glands; Addison's disease. The esophagus shows in its lower two-thirds elevated dot and larger nodules in great numbers. None of these are caseous, but the smaller points resemble the individual tubercles found in the spleen, liver, and other glands. The elevated dots and nodules found in the lower two-thirds of the esophagus are seen to be enlarged lymph follicles, invaded by miliary tubercles which at times become conglomerated. The mode of infection in this case offers no difficulties; it is really of hematogenous origin, the original focus being the diseased testicle."

This is the only case in which the esophageal foci have been limited to the lymphoid structures, and, as Cone suggests, there is a strong probability of this form being overlooked owing to the insignificance of these structures even when involved in a general tuberculosis. Without thorough microscopic examination such a focus might easily escape discovery.

Glockner describes a case which presumably belongs in this division. The patient, a man 48 years of age, had tuberculosis of both lungs, the pleura, liver, kidneys, spleen, esophagus, and peri-bronchial and mesenteric lymph glands. About the middle of the esophagus was a thickened zone, encircling the tube, which consisted of caseous tubercles which had infiltrated and were limited to the muscular coat. The mucosa and submucosa were normal, and there was no involvement of the peri-esophageal tissues.

Two of Mazzotti's cases can be ascribed to hematogenous infection with a strong show of reason, although the second has usually been credited to infection by the sputum.

This controverted case concerns a woman of 37 years who had tuberculosis of both lungs, ulcers in the intestines, and miliary tubercles in the liver. In the upper part of the esophagus the mucous membrane was considerably thickened and occupied by numerous caseous miliary tubercles. Bacilli were demonstrated.

His first case was a child of 10 years who had died of miliary tuberculosis of the brain, lungs and spleen, following tuberculosis of the bronchial glands. In the course of this general dissemination a miliary outbreak occurred in the esophagus.

V. Schrotter treated a man of 37 years who, eleven years before had contracted syphilis and who for the preceding year had had progressive difficulty in swallowing. Fleeting improvement followed mercurial inunctions and dilatation, but he soon relapsed and died. Examination showed a stenosis of the esophagus 15 cm. below the

larynx, due to fibrous masses and nodules in the muscular layer. The peri-esophageal tissue was somewhat thickened but the stenosed section was freely movable. Microscopic examination showed disseminated tubercles in the muscles and granulation tissue in the mucosa. Neither bacilli nor spirochetae were demonstrated. Both lungs were badly involved, and there were ulcerations in the ileum and trachea.

Another undoubted case of this nature is that reported by Staehelin-Burckhardt, a girl of 14 years, who died of tuberculous meningitis. The following is Staehelin-Burckhardt's anatomical diagnosis: "Meningitis tuberculosa. Miliary tuberculosis of the lungs, kidneys, liver, spleen, and thyroid. Chronic tuberculosis of the bronchial glands, the fibula and the tendon sheaths of the right leg. In the esophagus, in the upper third of the anterior wall, a clear-cut ulcer 6 to 10 mm. and 6 to 8 mm. in depth. In the base of the ulcer typical tubercles were found. At one point the process extended through the entire wall of esophagus and into the mucous glands of the trachea, without reaching the tracheal mucosa itself. At different points between the trachea and esophagus were found small masses of lymph-adenoid tissue, in which were typical tubercles."

The final case in this group is that recorded by Starck. A man of 48 years died following amputation of the thigh for "gonitis tuberculosa exsudativa." There was also bilateral apical tuberculosis. Post-mortem: Pleura thickened, adhesions, much liquid; trachea and larynx normal. Peritoneum: numerous nodules; mesenteric glands swollen and caseous; glands around abdominal aorta enlarged and caseous; esophagus adherent to pleura, lungs, pericardium and mediastinal glands; extensive diffuse dilatation, which extends in a funnel-shape towards the cardia, walls thickened; mucosa the seat of many ulcers; numerous tubercles in the muscular coat and the submucosa."

6. TUBERCULOSIS DUE TO CARIES OF THE VERTEBRAE: In this group I have been able to find but seven cases; three recorded by Penzoldt;[15] one by Kauffmann;[53] two by Uhde;[6] and one by Loeschner.[9]

Of Penzoldt's cases one was a man of 36 years, the second a man of 46, and the third a man 53 years of age. The first case had tuberculosis of the lungs and intestines, and caries of the fifth and sixth cervical vertebrae. Kyphosis and scoliosis. The posterior wall of the esophagus, opposite the fifth vertebra, was perforated by an abscess that originated in the diseased vertebrae.

In the second case post-mortem examination showed: "Caries of the first four dorsal vertebrae, with perforation of the abscess into the esophagus. Pachymeningitis on a level with the diseased vertebrae. Recent bilateral pleurisy. Pneumonia of the right upper lobe. Partial collapse of the right lower lobe." A sound, passed from the front through the cavity, entered the spinal canal. The perforation was 1 cm. in diameter. The only symptoms evoked were those dependent upon the disease of the cord.

The third patient had presented the signs of pulmonary phthisis and caries of the upper dorsal vertebrae. While under observation there occurred a sudden expectoration, unattended by cough, of an abundant bloody pus, with severe pain in the throat, dysphagia, chills, and collapse. Digital examination was negative; larynx normal; on the wall of the pharynx, on a level with the apex of the arytenoids, was a tumor-like swelling. Death occurred two days after the onset of these symptoms.

Autopsy: Chronic caseous pneumonia of both apices; caries of the first four dorsal vertebrae with large abscess; kyphosis. A fistula 7 mm. in width, extended from the abscess cavity into the esophagus.

At the point of perforation the esophagus was drawn to the right and fused with a lymph gland and the right half of the first dorsal vertebra. Below the perforation the esophagus had a right-angled kink, corresponding to the kyphosis. A sound passed into the fistula entered the abscess cavity, touched the carious bone, and entered the spinal canal. In none of Penzoldt's cases was there a histological confirmation of the diagnosis.

The case observed by Loeschner was a child in whom the abscess originating in caries of the vertebrae perforated into the esophagus. Ude, in 1856, reported two cases in both of which large abscesses had extended into the posterior mediastinum. In one case the only symptoms were a kyphosis involving the three upper dorsal vertebrae and motor paraparesis. A perforation three-quarters of an inch in diameter, with fibrous walls, extended into the esophagus. The food, both solid and liquid, entered the abscess cavity, except when the head was bent strongly forward, thus forming a fold at the under edge of the fistula.

In the second case there was caries of the dorsal vertebrae from the fourth to the tenth, and the resultant abscess had an opening into the esophagus at the center of the point where the third dorsal almost touched the body of the eighth dorsal. The cavity had suddenly opened, the pus passing through the intestinal tract.

The only other case in this division is Kauffmann's, reported in 1904, in which there was a tuberculous stricture of the esophagus consequent upon caries of the first two dorsal vertebrae. The patient, a man of 64 years, was admitted to the hospital on April 4, suffering with an abscess in the left cervical region, to which was attributed the existing difficulty in deglutition. After incision, a sound introduced into the wound passed into the esophagus. An esophageal sound, passed by the mouth, was arrested 18 cm. from the teeth. There was tuberculosis of both apices, and this condition, together with the character of the abscess, was sufficient to warrant the diagnosis of tuberculous stricture of the esophagus.

The stenosis gradually increased and became impermeable to the sound, and all foods, liquids and solids, escaped by the fistula which opened on the left side of the neck, or was promptly regurgitated. The patient was nourished by intestinal alimentation, and after May 14, through an intestinal opening. He died on June 22.

Autopsy showed advanced caries of the first two dorsal vertebrae, more marked on the lateral aspects of the bodies, leaving the spinal canal intact. The esophagus was stenosed at the superior orifice and distended into a globular shape. There was a cavity in the right apex, but this had no direct relation to the vertebral focus. The stenosis was undoubtedly due to the vertebral caries. There had been no disturbances of sensibility of the upper limbs, nor the slightest pain along the spine.

7. EXTENSION BY CONTINUITY FROM CASEOUS BRONCHIAL GLANDS: This, by far the most frequent etiological factor, is responsible for the following cases: Bartlett,[42] (2 cases); Weichselbaum,[19] Beck,[17] Pitt,[25] Orth,[28] (two cases); Zenker,[31] (2 cases); Barth,[4] Danel,[39] Mazzotti,[22] Gruenewald,[13] Schilling,[46] (2 cases); Zelenkoff,[20] Letulle,[33] (2 cases), Voelcker,[29] (4 cases), Penrose,[62] Barry,[23] Riviere,[51] (3 cases), Spillman (classified as due to sputal infection), Flexner (classified as due to sputal infection); Polandt,[21] Nowak,[30] Hanot,[27] and Guisez-Abrand.[61] Zerenin's case probably belongs in this group, but owing to some doubt it has been placed in the list of unclassified cases.

In the first of Bartlett's cases the anterior wall of the esophagus had five fistulous openings, communicating with cavities within as many peri-bronchial and posterior mediastinal glands. About the openings, and completely covering the mucosa of the surrounding parts, were numerous ulcers and caseous nodules. There was tuberculosis of the intestines, liver, kidneys and spleen. Bartlett's diag-

nosis was, "chronic lymphatic tuberculosis with tuberculous pleurisy and secondary general miliary tuberculosis."

His second case was a negro, in whose esophagus was found a single perforation leading into a gland behind the bifurcation of the trachea. There were four small ulcers about the opening of the fistula. There was miliary tuberculosis of the liver, spleen, peritoneum and lungs. In neither of these was there clinical evidence of an esophageal lesion.

A second case in which there were numerous perforations is that of Weichselbaum. Eight fistulae, all located about two inches above the bifurcation of the trachea, communicated with caseous glands. Almost the entire esophagus was studded with nodules. There was pulmonary, intestinal, laryngeal and tracheal tuberculosis, and the cervical and mediastinal glands were caseous.

Beck's case was a man with pyo-pneumothorax, tuberculous meningitis, tuberculosis of the lungs, larynx, bronchial and mediastinal glands, and trachea. In the anterior wall of the esophagus, on a level with the bifurcation of the trachea, was a diverticulum due to traction of adherent caseous glands. Above the diverticulum was a large ulcer surrounded by small nodules. The ulcer corresponded with a softened area in a mass of adherent glands lying between the esophagus and the trachea.

In Pitt's case, and two of Orth's, perforation occurred secondary to adhesions between the esophagus and bronchial glands, in the neighborhood of the bifurcation of the trachea. Zenker's two cases were of a similar nature, but in one the entire tube was the seat of a severe phlegmenous inflammation. Additional cases of the same character are recorded by Barth and Danel, the opening in Danel's case measuring 1 cm.

The cases reported by Mazzotti and Schilling are similar to Beck's; instances of traction diverticula with ulcers about the fistulous openings.

Mazzotti's case was a man of 21 years who had succumbed to pulmonary and intestinal tuberculosis. Two perforations, situated at the junction of the upper and middle third, led into caseous bronchial glands. At the junction of the middle and lower third were two more ulcers, and somewhat lower a third group. The caseous glands also communicated with the left bronchus.

Cases in which infection of the esophagus was a result of perforation of tracheal and peri-bronchial glands are recorded by Gruenewald, Lalague, Meyerhoff and Denonvilliers.

Londe's case was a man of 50, who had died of a hematemesis. There was miliary tuberculosis of the pleura, with caseation of the bronchial glands and their amalgamation with the esophagus. A fisutla, at autopsy still filled with blood, extended from the glands into the esophagus immediately below the bifurcation of the trachea.

Zelenkoff reported a case in which impaired nutrition and death followed gastrostomy. The glands at the root of the right lung were caseous and confluent, forming a mass that surrounded the esophagus and which had ulcerated through its anterior wall. In the glands was a cavity as large as an egg, filled with detritus.

Of the two cases described by Letulle one is quite similar to Londe's case, while doubt attaches as to the tuberculosis nature of the other. In this patient a tuberculous empyema ruptured into the esophagus but this organ did not show any giant cells or tubercle bacilli.

Guisez and Abrand observed a man of 37 years, who was markedly emaciated as the result of a long-standing pulmonary phthisis, and who for three months had suffered from dysphagia during the swallowing of solid food. Esophagoscopy showed a pocket-dilatation occupying the upper third of the tube, of from 200 to 250 cm. capacity; 22 cm. from the dental arch was a stenosis admitting only a filiform bougie No 9. The mucosa was blanched and ulcerated, and the walls were infiltrated and immobilized by adhesions to the neighboring tissues.

The patient died one month after examination, and the autopsy showed an esophageal stenosis above the level of the bifurcation of the trachea. This region was entirely surrounded by swollen glands, two of which were the size of a hen's egg, and which had undergone caseation. The anatomical diagnosis was "Case of esophageal tuberculosis through secondary invasion of the walls from tuberculous glands."

Voelcker's first case was a boy of 9 years in whose esophagus there was an opening 5 mm. in diameter, somewhat below the level of the bifurcation of the trachea, which communicated with a cavity filled with caseous material. Abdominal tuberculosis was absent. The three other cases seen by him, the result of 2,504 autopsies upon children, were of a somewhat similar nature. Penrose's case was a baby of 7 month, but proof is lacking as to whether perforation was followed by actual tuberculosis of the esophagus.

Barry observed a case that had run a symptomless course, in which there was an esophageal fistula leading into the trachea. The posterior bronchial glands were caseous, communicating by fistulae

with the trachea, bronchus, and the superior vena cava. It was to the hemorrhage occasioned by this last opening that death was due.

Riviere has recorded three cases, but, like so many others in this group, they lack histological confirmation. In two of these cases the gland had completely emptied its caseous contents into the esophagus, and the gland cavities were lined with an apparently healthy mucous membrane.

Additional cases of perforation, without, however, the establishment of actual tuberculous foci in the walls, are reported by Polandt, Nowak and Hanot. In Nowak's case, a woman of 61, there was primary tuberculosis of the bronchial glands, from which fistulae extended into the esophagus, pericardium and trachea. The case of an infant, 18 months old, in whom perforation occurred into the left bronchus, was recorded by Polandt, and Hanot describes the case of a man of 22 years in whom rupture took place into the esophagus and trachea.

In the cases reported by Spillmann and Flexner the infection probably occurred through the sputum, and the perforations took place in the opposite direction from the others here described, that is, the ulcers originated in the esophagus and ruptured outwards. These are the only two cases of this nature.

8. UNCLASSIFIED.

In this group are placed the cases that cannot be definitely ascribed to any one particular channel of infection, i. e., those of Moure and Viel,[39] and Zerenin.[41]

The first is one of the very few cases in which a clinical diagnosis was definitely made, and in which both the subjective and objective symptoms were accurately observed; hence it is deserving of detailed report. A man, 36 years of age, during the course of a meal, suffered from an attack of dysphagia so sudden that he believed it to be due to the swallowing of a foreign body. Following this he was unable to swallow anything but purees and liquids, the latter only when hot. Deglutition was followed by a sensation as of a foreign body in the mid-sternal region, and frequently by regurgitation. Radiography showed only hypertrophy of the tracheal and bronchial glands. An esophageal sound (large) was stopped 34 cm. from the dental arch by spasm of the tube. This soon yielded and allowed free passage. For a few days following he was able to swallow eggs.

Esophagoscopy showed the posterior wall, and in particular, the left antero-lateral wall, occupied by a series of confluent ulcers with irregular borders. The neighboring mucosa was congested

and soft and bled easily. This same characteristic was observed by Schrotter, the bleeding in his case being sufficiently profuse to interfere with the examination. The lesions appeared to be superficial and the esophageal wall preserved its suppleness. The lesions extended about 8 cm. and the tube above it did not appear to be dilated. It was evident that the dysphagia was due to the chronic spasm induced by the ulcers. Intestinal obstruction developed and examination showed an irregular mass in the pelvis. Abdominal incision evacuated several liters of fluid and showed generalized tuberculous peritonitis, with nodules filling the small pelvis. Death occurred four months after onset of the subjective symptoms. An autopsy could not be obtained.

Zerenin, under the title "Esophago-cervical abscess of a tuberculous character," described a case that in some respects is similar to that observed by Kauffmann. A woman of 19 years had had, for a year a gradually increasing growth over the thyroid, that had been lanced several times, and which once was the object of an unsuccessful attempt at excision. When first seen by Zerenin there was a swelling, the size of a fist, on the anterior surface of the neck near the thyroid, from which pus oozed through several fistulae. The swelling was hard and adherent to the surrounding tissues. A probe entered to a depth of 2.5 cm. Temperature 37.5° to 38.7°. A month later the cervical glands enlarged and a diagnosis of sarcoma was made.

Removal of the growth was not followed by any improvement in the general condition. Three subsequent operations, with removal of the cervical glands were performed.

Nine months from the time of the first examination an abscess which appeared on the left side of the neck was opened, and shortly afterwards a similar pus cavity on the right side. From the latter food escaped during deglutition, this symptom persisting until death, which occurred three months after the appearance of this symptom.

Microscopic examination of the tissue revealed tubercle bacilli. At autopsy a mass of caseous glands, the size of a fist, was found upon the upper surface of the diaphragm at the base of the right lung. Tubercle bacilli were present.

In a review of these cases certain features assume a prominence that warrant a more detailed attention: (1) The tendency to involvement of the esophagus in cases of chronic lymphatic tuberculosis; (2) the frequency of association of intestinal and esophageal lesions; (3) the insignificance of the subjective symptoms; (4) the

diagnostic value of dysphagia and odynophagia of sudden onset; (5) and the role played by tuberculosis in the production of traction diverticula.

1. Chronic lymphatic tuberculosis was present in forty-four of the cases that afterwards developed esopahageal foci, an exceedingly high proportion and one that establishes a direct etiologic relationship. In a majority of the remaining cases mention is not made as to the presence or absence of this condition.

2. In 22 cases there were coincident lesions of the intestines. In view of the ease with which infection can reach the intestines in these cases it is probable that a larger proportion would show this complication, but the authors are usually silent upon this point.

3. The subjective symptoms have usually been so insignificant, if not entirely lacking, that the condition has generally been overlooked. In only a few cases has the existence of an esophageal focus been suspected.

In ten cases in which a stricture was present, due to the drinking of acids, to the presence of malignant growths or the thrush fungus, the tuberculosis occurred in tissues already diseased, and hence no symptoms developed aside from those occasioned by the underlying disease. In such cases a diagnosis is possible only through microscopical examination.

In one case the tuberculosis apparently preceded the cancerous invasion, but no symptoms appeared until the latter disease developed. In the comparatively few cases in which uncomplicated tuberculosis evoked symptoms, they have been largely those of stricture. There are eight such cases, in two of which a clinical diagnosis, arrived at largely through exclusion, was made. Other symptoms rarely noted have been the sudden discharge of bloody pus by the mouth, and in one case by the rectum, following the rupture of abscesses into the esophagus.

4. The only suggestive symptoms are pain and difficulty in swallowing developing during the course of chronic lung and lymph gland tuberculosis, or of caries of the vertebrae. These symptoms, under such conditions, should always direct attention to the esophagus.

The case of Moure is suggestive for in it we have the appearance of acute severe dysphagia, without previous warning, and followed by chronic spasm. A somewhat similar picture was presented by one of the cases observed by Guisez and Abrand, in which the final attack had come on in this way although it had been preceded by sev-

eral others of a similar nature. In Penzoldt's third case the sudden outpouring of a large quantity of pus in a patient in whom expectoration had always been scanty, accompanied by chills and collapse, was almost diagnostic.

In the ulcerative cases odynophagia is the chief symptom, accompanied by spasmodic contraction. This form is usually productive of a rapidly developing cachexia.

Aside from these few suggestive symptoms, any or all of which might originate in totally different conditions, we have no symptoms of value. By esophagoscopy a diagnosis is occasionally possible. In 1909 Gootstein wrote: "Tuberculosis has not up to this time been observed by the esophagoscope. A certain diagnosis could not be made by the esophagoscope except by a previous biopsy." Since then a few cases have been so observed and diagnosed. The chief characteristics noted, aside from those accompanying tuberculous lesions of other mucous membranes, consisted in the congestion and soft appearance of the mucous membrane, surrounding and including the zone of ulceration, and the tendency of the membranes to bleed.

5. In the entire series there are five cases of traction diverticula. Aside from these there are a considerable number of spurious cases, in which, as a result of fusion with carious glands, the esophageal wall became perforated with discharge of the gland-contents and the formation of a deep pocket. This condition might easily be mistaken for a true traction diverticulum.

These cases of traction diverticula are very instructive, for they show that the fusion and traction of tuberculous glands may be an important etiologic factor in this condition. Diverticula frequently occur on the anterior wall, just below the end of the trachea at the sits of the bifurcation gland. This gland is frequently the seat of tuberculosis, especially in children, and is sometimes the only location, the disease not advancing from this original focus. Therefore, in cases of diverticula, especially of this locality, tuberculosis of the glands must be given consideration.

In 140 autopsies on tuberculous cadavers made at the Henry Phipps Institute, small diverticula extending about 3 mm. in depth, were found in four cases, but the causative pathological condition was not uncovered.

The diagnosis of tuberculosis must be made largely by exclusion, eliminating such diseases as syphilis, cancer, caustics, stenosis through compression, actinomycosis, non-tuberculous diverticula

and sporotrichosis. Microscopical examination is usually essential for differentation.

The question of treatment demands but brief consideration. In only a few of the cases described could treatment, had it been instituted, have been of any avail. In the majority the complicating lesions were of so aggravated a nature as to have made any local interference entirely unwarranted.

With the early recognition of the esophageal lesions, however, and their treatment under visual control, there is no apparent reason why the local results should not approximate those attained in the larynx. For stenosis, gradual dilatation, carried out with extreme care, may be tried, and the same treatment should give some relief from the spasms incident to ulceration. The local application of the electric cautery, lactic acid, formalin, orthoform, propesin, etc., with the internal administration of sedatives of the bromid type, will about exhaust our present resources.

Metropolitan Building.

Ozena Problem. RALPH H. PARKER, *Jour. of Ophthal. and Oto-Laryngol.*, Jan., 1913.

"Ozena is an inflammation of the nasal *mucus* membrane accompanied by fetor and crust formation and followed by atrophy of the *mucus* membrane. The *mucus* membrane bears much the same relationship to the nasal cavity that the peritoneum does to the abdominal cavity."

[This is not the accepted understanding of the meaning of "ozena." Besides, the peritoneum bears no similiarity whatsoever to the nasal *mucous* membrane. The former being a serous membrane within a closed cavity and with a histology and histo-pathology entirely unlike the nasal mucous membrane.—Reporter.]

Among conditions classified as ozena are: syphilitic lesions, operations upon lower turbinate, operations upon adenoid tissue, nasal gonorrhea and suppurative sinusitis. STEIN.

THE OBLITERATION OF THE MASTOID EXCAVATION BY THE IMPLANTATION OF A TISSUE-FLAP TAKEN FROM THE TEMPORAL MUSCLE.*

DR. SAMUEL IGLAUER, CINCINNATI.

The prolonged after-treatment and the uncertain cosmetic results constitute two great drawbacks to the simple mastoid operation as ordinarily performed. Under the accepted method of after-treatment, by packing and granulation, it usually requires weeks and not infrequently months for the mastoid excavation to become obliterated, and this often proves an ordeal for both patient and physician.

From time to time various methods have been proposed to shorten the duration of the after-treatment and to improve the cosmetic results of the simple mastoid operation.

Macewen[1] was the first to suggest that the healing process might be hastened by increasing the exposed surface of the soft parts through the removal of a portion of the posterior meatal wall. Plummer and Germain,[2] and Hopkins[3] advocated a somewhat similar procedure. Kuester[4] reported excellent results from the reposition of an osteo-plastic flap formed from the periosteum and cortex of the mastoid process. Blake,[5] Sprague,[6] Riek[7] and Bryant,[8] and more recently Holmes[9] have enthusiastically advocated the blood-clot dressing; while Low[10] recommended the introduction of animal serum into the mastoid excavation.

According to Barr[11] the closure may be hastened by filling the mastoid gap with a Moorhoff iodoform-wax plug introduced the second week after operation. Beck[12] advocates the use of a bismuth-paste dressing. Leland[13] introduces a large periosteal flap into the mastoid wound in order to close off the aditus and hasten the healing process. Mosher after removing the posterior meatal wall inserts a pedunculated flap formed from the post-auricular soft parts.

In April, 1910, I reported a case illustrating a new operation for the primary closure of the mastoid wound by means of a flap taken from the temporal muscle.[15,16] Dr. Neumann informs me that he has employed a similar plastic for the secondary closure of a persistent retro-auricular fistula, and that mention of this case ap-

*Read at the annual meeting of the American Academy of Ophthalmology and Oto-Laryngology, Niagara Falls, August 22, 1912.

pears in the Transactions of the Oesterreichische Otologische Gesellschaft, February, 1911.

The operation which I have devised consists in the exposure of the posterior portion of the temporal muscle from which a pedunculated flap is formed. This flap is then rotated downward and backward, and is tucked into the mastoid gap, which is thereby completely filled with viable tissue. Drainage is provided by a rubber tube extending from the mastoid antrum to the lower angle of the mastoid incision.

The close topographical relation of the mastoid process and the temporal muscle together with the abundant blood-supply of the

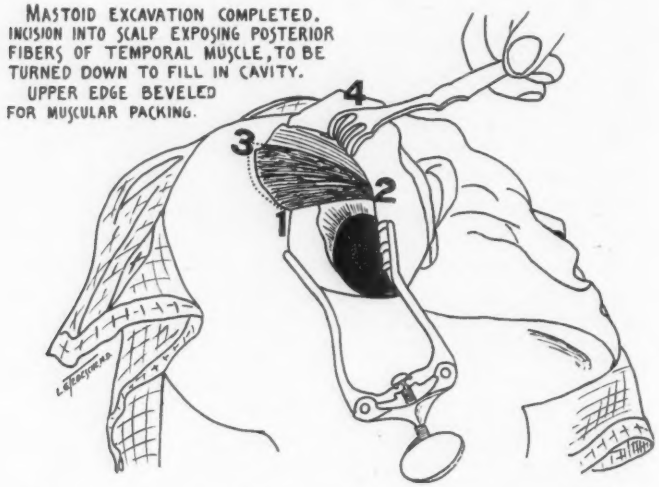

Figure I. Mastoid exenteration completed. Incision carried into scalp, exposing temporal muscle, from which a flap (1, 2, 3) is formed. Scalp (4) drawn forward.

latter render it especially available for a plastic operation of this kind.

Technic: The scalp is shaven somewhat higher than for the usual operation and the field is sterilized with tincture of iodin. The simple (Schwartze) operation is performed in the usual manner, the mastoid cavity is thoroughly excavated and repeatedly cleansed with sponges saturated with hydrogen peroxid.

The operator now re-sterilizes his hands (fresh gloves), and with instruments not previously used, prolongs the original mastoid

incision upward and forward into the hairy scalp. This incision (Figure III) lies immediately anterior to the posterior border of the temporal muscle, is concave forward and about one and a half to two inches in length. The scalp (Figure I,[4] is now dissected downward and forward exposing the underlying glistening temporal fascia. The posterior portion of the temporal muscle and fascia are now freed from the pericranium and a triangular flap (Figure I.[1 2 3]) with its apex downward is formed by splitting off the exposed muscle in the line of its fibers, the pedicle being formed of the fibers passing under the zygomatic arch and contains branches of the temporal arteries. The flap is now rotated downward and

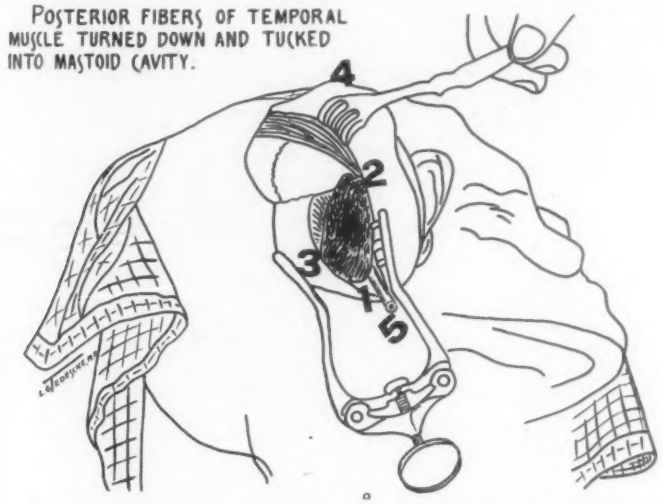

Figure II. Muscle flap (1, 2, 3) turned downward and backward, and tucked into mastoid cavity. (2) Pedicle of flap. (4) Scalp. (5) Drain.

backward into the mastoid cavity (Figure II,[1 2 3]). If the temporal ridge be prominent it should be chiselled away with the underlying bone to provide a groove for the pedicle. At times the latter may be too short or too thick but it can readily be elongated by cutting obliquely across some of its anterior fibers. The flap is anchored by a few catgut sutures fastened to the periosteum at the lower angle of the mastoid wound. A small rubber drainage tube is introduced under the flap and extends from the antrum to the lower angle of the incision. A small puncture is now (or previously) made through the scalp immediately over the dead space left

by the removal of the muscle flap, and a gauze wick is drawn through at this point (Figure III) to provide exit for any blood which may accumulate.

Sutures are now introduced into the scalp incision, the upper strands are knotted but the lower ones are left untied to provide for drainage (of blood). The latter sutures are drawn taut on the first or second day after operation. (Figure III, [1 2]). The mastoid incision is closed by interrupted sutures.

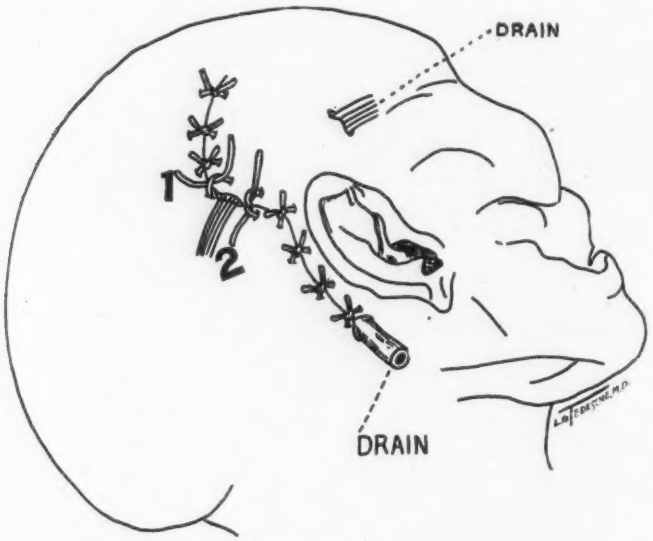

Figure III. Incisions closed. Sutures 1 and 2 left untied. Drains in situ.

Several layers of gauze are packed over the dead space left by the removal of the flap and a very firm pressure-bandage is applied.

The wound should be dressed on the first or second day after the operation and any blood which may have accumulated under the scalp should be expressed. At the same time the drainage tube from the antrum should be removed and a fresh one introduced if necessary.

Results of the Operation: I have now performed this operation upon ten cases, too small a number for statistical purposes. The results of these operations may be summarized as follows: Among the disadvantages of the procedure it should be stated that in several cases difficulty was encountered in the dead space immediately

overlying the zygomatic arch, where a hematoma formed and in some instances suppurated. However, this accumulation when present was readily pressed out and the case then proceeded towards recovery. The more recent methods which I have adopted, namely, leaving some of the sutures untied, should in a large measure obviate this difficulty. Transient edema of the forehead and eyelids on the operated side was noted several times and was due either to the formation of a hematoma or the interference with the lymph flow from the affected region.

Figure IV. Showing cosmetic result eighteen days after operation. Patient practically recovered although site of emergence of drainage tube is still evident.

Among the advantages of the operation were the following: The transplanted muscle in nearly every case survived and became adherent in its new location and filling out the mastoid excavation. In one case requiring a secondary operation (for causes unrelated to the flap) six months after the transplantation some of the tissue was removed and examined histologically. The report of Dr. Mombach is as follows: "Examination shows a large amount of healthy muscle tissue, the transverse striations which are marked, also a number of transversely cut muscle bundles. In part the section

shows muscle undergoing cloudy swelling. Other parts of the section show a considerable amount of fibrous connective tissues. Throughout the section one finds blood-vessels which are intact. In another instance a specimen removed about three weeks after operation from a case in which the wound was of necessity left open because of a torn sigmoid sinus, the flap which had been exposed to the air failed to reveal any intact muscle fibers, but showed connective tissue fibers and round cells infiltration. (Report of Dr. W. E. Lucas).

The incisions, excepting at the points of emergence of drainage tubes, usually closed by primary union. Free drainage from the mastoid wound and antrum took place through the conduit under the transplanted muscle and the discharge usually ceased in about ten days or two weeks. The drainage opening showed but little tendency to close until the discharge had ceased. In some cases the discharge from the auditory canal persisted a few days longer than from the mastoid. (Politzerization hastened resolution in the tympanum.) In from two to four weeks, in most cases, the patients were practically well, that is, the discharge from the wound had ceased, but a few granulating areas in the scalp or mastoid incision remained. These cases demand very little attention and did not require the care of persons especially trained. The cosmetic results (Figure IV) were very good since the extra-incisions in the scalp were concealed by the hair and the mastoid depression was obliterated. The position of the auricle remained excellent and no disturbance in the function of the temporal muscle was noted in any case.

Indications and Contra-Indications: This myoplastic operation may be generally employed for the closure of the simple excavation in uncomplicated cases of mastoiditis. It can, in all probability, be employed in selected radical cases. It is contra-indicated in debilitated persons, in cases of severe infection, and whenever the maintenance of prolonged drainage is especially desired.

Conclusions: 1. The plastic closure of the mastoid gap by the implantation of a portion of the temporal muscle is readily accomplished. 2. Some transient difficulty may be encountered with the dead space under the scalp. 3. Drainage, the prime object of mastoidectomy is provided for, despite the fact that the mastoid excavation is almost completely obliterated by the implanted tissue. 4. The duration and difficulties of the after-treatment are greatly reduced by the implantation operation. 5. The cosmetic results of the operation are very good.

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New Principle in Esophagoscopy and Gastroscopy. RICHARD LEWISOHN. *Ann. of Surg.*, Jan., 1913.

The author considers first the reasons why esophagoscopy is not more generally adopted by surgeons, pointing out the discomforts, difficulties and dangers attendant upon the use of the esophagoscope. The following are the three main requirements of a satisfactory esophagoscope: 1. The introduction must be possible in the manual position of the head. 2. The instrument must be so constructed that it actually passes in the longitudinal axis of the esophagus and not at an angle of this axis. 3. The esophagoscope should only be passed downward along the esophagus under guidance of the eye to avoid perforation.

Based upon these considerations, he has constructed an esophagoscope consisting of two portions,—a horizontal which lies in the mouth of the patient, and a vertical consisting of a telescope composed of six separate tubes which may be pushed down the esophagus. He uses illumination from the proximal ends, and the rays converged down the tube by means of a condenser which concentrates them on a mirror, from which they are thrown on another mirror at the junction of the horizontal and vertical tubes, which throws the rays down the tube. He appends the report of ten cases in which he has used his esophagoscope with excellent results.

PACKARD.

DECOMPRESSION FOR THE RELIEF OF DISTURBANCES OF THE AUDITORY APPARATUS OF INTRA-CRANIAL ORIGIN.*

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The beneficial influence of decompression for the relief of edema of the optic nerve with failing vision, from increased intra-cranial pressure, is now generally recognized.

The exact cause of the papilledema, its early appearance in some cases and its long delay or entire absence in others, is still not completely understood. The length of the optic nerve is favorable to the development of not only a neuritis from direct pressure, but also from an edema of the sheath itself. The latter is bilateral; the former is unilateral. Examination of patients and operative findings by Payton,[1] caused him to regard the late papilledema following brain tumor as due to general cerebral edema. But that there is some other factor than cerebral edema, or edema of the nerve-sheath, is shown by the frequency in which one-sided papilledema is seen in the early stages of brain tumors.

Cushing has demonstrated that many of the palsies, such as those of the third and sixth nerves occurring at a distance from the growth, are due to direct pressure from disturbance of the circulation. That papilledema does occur from direct pressure I observed in a case of a large hemorrhagic pial cyst of the frontal region on which I operated, the cyst having caused a marked homilateral optic neuritis with hemorrhages with but very slight involvement of the opposite.

All opthalmologists have observed patients suffering from marked optic neuritis without any appreciable diminution of the central vision; and this may continue for a long time. One case that I have personally observed has had a duration of over five years without failure of vision, while periods of one or two years are far from infrequent.

That slight pressure, properly applied to unprotected nerve-tracts, may cause temporary suspension of function without any general increase in the intra-cranial pressure is well known. This was exemplified in a case of tempora-sphenoidal glial cyst causing

*Read at the meeting of the American Otological Society, Atlantic City, June 11, 1912.

hemianopsia, on which I performed a decompression in two stages Following the first stage before opening the dura the hemianopsia totally disappeared, although this had been known to be present for several months; the amount of pressure thus relieved being necessarily very slight.

Unfortunately we have not a method whereby we can diagnose a neuritis of the acoustic nerve before great reduction in the hearing occurs, although repeated, careful, functional tests of the cochlear and vestibular apparatus and of the relation of the different functional tests to each other will enable us to do this with more and more assurance in the future.

The dural sheath of the acoustic nerve, unlike the optic nerve-sheath, is very short, but that this space is frequently the seat of purulent effusion in meningitis is a frequent post-mortem observation.

The degree of increased intra-cranial pressure which, with or without the other unknown factors, so frequently produces intense papilledema with subsequent total blindness is manifestly insufficient to cause a similar loss of function of both auditory nerves; as bilateral deafness in cerebellar tumors is very rare. But the acoustic nerves must be subject, in subtentorial growths, to considerable pressure, edema and possibly to neuritis; the same degree of pressure and edema, perhaps, which in the optic nerves would produce an edema discoverable by the ophthalmoscope, but without marked diminution of vision.

Accurate microscopical pathological examinations of the auditory nerve are still so seldom made that an assertion of the frequency of acoustic neuritis is impossible. Again we have little knowledge of the resistance of the acoustic nerve to mechanical pressure. Neuritis from toxic processes is clinically well recognized, and Orr, Rows and Milligan[2] have shown embryologically that there are two points in the nerve especially vulnerable to such invasion.

While the deafness associated with intra-cranial tumor may not be due to a neuritis and edema, still it is conceivable that such edematous pressure combined with other factors, such as slight direct pressure, may cause a suspension of the function of the acoustic nerve at one of its two vulnerable points, enough to produce deafness, the relief of the pressure restoring the hearing. (The first and third cases reported certainly suggest such a view.)

If these contentions are true, then decompression in the early stage should have as beneficial an influence on the aural disturb-

ances as it has on the papilledema; although as far as I am aware this has not previously been undertaken.

CASE OF BRAIN TUMOR ASSOCIATED WITH TOTAL DEAFNESS OF BOTH EARS AND NONEXCITABILITY OF BOTH VESTIBULAR APPARATUS. DECOMPRESSION: TEMPORARY RESTORATION OF HEARING IN ONE EAR, THE VESTIBULAR APPARATUS REMAINING NON-EXCITABLE.

Case 1: Mrs. F. B., age 38, Newark City Hospital, Dr. C. C. Beling's service. Neurological examination by Dr. Beling. Previous history: cancer of the left breast, operated upon. Symptoms: severe pains in head, dizziness, nausea, diplopia. Attacks of "queer feeling" in hands, more in left, goes up to back of head; compelled to lie down and close eyes during attacks. Suddenly, one week ago, paralysis of left side of face and transient paresis of right arm and leg. Mental condition: emotional; suicidal tendency from pain in head; occasionally forgets what is doing and saying; great restlessness. Examination: left-sided facial paralysis; protrudes tongue to left; grip of left hand, less than opposite; right knee-jerk absent; left sluggish; right plantar reflex absent; left Babinski; no ankle clonus. Eyes: double papilledema, pupils equal, react to light and accommodation. Right vision 20-30; left vision counts fingers at three feet. Hearing very poor in left ear; greatly impaired in right ear.

Four months later returned to hospital with intense pain in head, unable to stand unaided. Gait shuffling; staggering, usually towards right. Speech thick, with some slurring. Double facial paralysis, complete of left, partial of right. Patella reflexes absent; Babinski negative on left side; slight on right side. Eyes: left corneal anesthesia; left pupil smaller than right; intense papilledema of both eyes. Left vision nil; right, counts fingers at few feet. For last three weeks totally deaf in both ears.

Operation, October 19, 1911: Double decompression over both sides of cerebellum; removal of bone from mastoid to mastoid, and from above transverse sinus to margin of foramen magnum. Dura not opened. Six weeks after operation, headache and vertigo entirely relieved; gait shuffling but walks around ward. Complains of numbness of thumb and first two fingers of left hand. Left facial paralysis still complete. Right side of face, while unable to close eye, lower part works well. No corneal anesthesia. No sensory disturbance of face. Reflexes of upper extremity present. Patella reflexes can only be produced by reinforcement. Plantar reflexes very sluggish. No Babinski. Papilledema entirely disap-

peared but optic nerves atrophied. Right vision, counts fingers at two feet. Left, same. Hearing: right ear, three weeks after operation heard loud voices, now ordinary conversational voice heard at distance of four feet. Left ear entirely deaf. Vestibular appartus. No spontaneous nystagmus. Peculiar horizontal oscillation of eyeballs. Rather jerky action in moving eyes in different directions. Rotation, galvanic and caloric (cold) tests, the latter applied in both ears separately and combined, all fail to produce any nystagmus or to cause sensation of dizziness.

Later history: After several months of freedom from general symptoms of increased intra-cranial pressure, during which patient exhibited a tendency to over-jocularity; gradual return of headaches; anesthesia and later ulceration of left cornea; gradual reduction of vision and hearing. Now, eight months after operation, left eye totally blind; right, perception of objects; total deafness of both ears.

The important fact in this case was that, with total deafness of both ears, the removal of pressure by decompression was followed by the restoration of the hearing of one ear to conversational voice at four feet, although the caloric, galvanic and rotary tests still failed to reveal any excitability of the vestibular apparatus.

While a positive diagnosis of the site of the lesion is perhaps unwise, both Dr. Beling and myself are inclined to regard the patient as suffering from an infiltrating pontine cerebellar angle tumor, with occasional hemorrhage into its substance. Hemorrhage would account for the sudden paralysis of the face with transient paresis of the opposite arm and leg, although this might be due to a transient circulatory disturbance, such disturbances being, we are convinced from autopsy findings in cases which had previously been examined clinically, far more frequent than is generally recognized.

CASE OF PROBABLE TUMOR OF THE ACOUSTIC NERVE-SHEATH; DECOMPRESSION; TEMPORARY DISAPPEARANCE OF ALL RETRO-LABYRINTHINE VESTIBULAR SYMPTOMS.

Case 2: G. M., aged 28. Newark City Hospital, Dr. C. C. Beling's Service. Neurological examinations by Dr. Beling. History: No previous illness. First noticed that could not hear well with left ear and for past two years total deafness of left ear. For past two years occasional "shooting pains" in arms, legs and face. During past six months "pains" very frequent, especially of left side of face, flank, and abdomen; constant tinnitus; severe headaches; vertigo; sensation of rotation towards left. At present vertigo so

severe that cannot walk without assistance, always falls towards left. Pains in left ear, face and abdomen have recently become cramp-like and almost constant. Has not eaten food for several days. Nausea but no vomiting. Is afraid to sleep as fears will die. Slight tinnitus in right ear.

Examination. Facial expression drawn and anxious, fine facial tremor, no facial paralysis, hyperesthesia of left side of face, taste of left side of tongue lost, does not recognize salt or sugar; right side normal. Cramp in left masseter on opening mouth widely. Tongue is protruded in median line. Tremor of both legs and arms. Fine tremor of right upper extremity. Attempt to grasp object with left hand evokes awkward movements, resembling athetoid movements; on being handed a dynamometer, makes peculiar movements, beginning in the little finger and extending in a rhythmical manner through fingers, wrist and forearm. The motions resemble those normally performed by the fingers, wrist and forearm in screwing, with the fingers and ball of the thumb, from left to right, a round-headed valve, placed with its top looking downwards. Left arm, pronation and supernatation rapidly continued, produces retardation and awkwardness of left hand, (diadococinesis). Dynamometer: L., 85-94-78-106; R., 78-18-90-100. Reflexes: Knee jerks normal; abdominal reflexes normal; no Babinski; no ankle clonus; no Oppenheim.

Eyes: slight paresis of left external rectus; marked spontaneous horizontal nystagmus on looking towards left; very slight rotary and horizontal nystagmus, on looking to right: both pupils react to light and accommodation; right pupil at times slightly eccentric, and larger than left (spasticity of left); left corneal sensibility markedly less than right; both fundi normal.

Hearing: left, total deafness; right, for conversational voice apparently normal. Vestibular reactions; left ear caloric (cold), followed by marked nystagmus in all directions. (Left vestibular apparatus is hyperesthetic.) During induced nystagmus still falls to left, in all positions of head. Right ear: Caloric reaction (cold) causes no alteration in spontaneous nystagmus. (Right vestibular apparatus not excitable to cold).

Operation, April 29, 1911: Decompression over both sides of cerebellum. Following operation marked and rapid improvement in all symptoms. Four months after operation: no headaches, no dizziness, walks and works perfectly well. Can stand with eyes closed and feet together but when does so has sensation of falling

towards left. No diadococinesis or disturbance of co-ordination of left upper extremity. No corneal anesthesia; very slight nystagmus on looking towards left, which latter also still causes some mental confusion from the paresis of the left sixth. Right pupil still slightly larger than left. Patient apparently hears ordinary voices with left ear at distance of two feet. (This may not have been the fact, as patient was not tested with a "noise" apparatus). Tinnitus in left ear still present but slight, and entirely relieved by lying on left side. No tinnitus of right.

Nine months after operation; gradual return of nystagmus, and diadococinesis of left arm, but no headache or vertigo.

Present condition, fifteen months after operation; diadococinesis, and inco-ordination of left upper extremity; if directed to point has an oscillatory, horizontal movement and then suddenly shoots arm forward. Slight contraction of color field of left eye, no interlacing. Long, slow, horizontal nystagmus on looking toward left; short, quick, rotary nystagmus on looking towards right. Rotation causes a momentary increase of the nystagmus away from lesion and adds rotary element to horizontal nystagmus towards lesion. Rotation causes no dizziness. Caloric (cold) reaction negative in both ears; although it is possible that when applied to the right ear it may at times momentarily lessen the horizontal nystagmus towards the lesion and quicken the rotary nystagmus away from the lesion, (paradoxical reaction). Galvanic tests have no influence whatever.

The importance of this case lies in the undoubted influence of the decompression on the nystagmus. For several months the patient apparently heard with the affected ear, but I have so frequently been mistaken in this that not having properly tested him with the "noise" apparatus, I am unwilling to state such to be the fact.

The patient is probably suffering from a tumor beginning in the auditory nerve-sheath and gradually pressing on the cerebellum, as is shown by the early appearance of the deafness followed later by fifth, sixth, seventh and ninth nerve involvement and then typical diadococinesis and inco-ordination of the upper extremity of the same side; the latter being typical of cerebellar involvement, as there is no accompanying reflex disturbance, no Babinski and the dynamometer records are practically of equal strength in both arms

CASE OF INCREASED INTRA-CRANIAL PRESSURE OF UNKNOWN ORIGIN, PROBABLY TUMOR OF THE CEREBELLUM, PRESENTING: VERTIGO—SENSATION OF PRESSURE ON THE TOP OF HEAD—CONTRACTED AND INTERLACING COLOR FIELDS—CEREBRO-SPINAL FLUID UNDER PRESSURE; WITH WHICH WAS ASSOCIATED: PROGRESSIVE DEAFNESS ENDING IN TOTAL DEAFNESS IN LEFT EAR, AND BEGINNING DEAFESS IN THE RIGHT EAR. DECOMPRESSION: FOLLOWED BY ENTIRE RELIEF OF ALL GENERAL SYMPTOMS, WITH PARTIAL RESTORATION OF HEARING IN LEFT EAR AND COMPLETE RESTORATION IN RIGHT EAR.

Case 3: J. J. H., Fireman. Patient of Dr. H. Hart, first seen September 19, 1911. History. Tubercular family history. About three years previously had attacks of dizziness slight in degree. During last few months "dizzy attacks" have become so severe that is unable to attend to duties; attacks come on chiefly after eating. Sudden movement of head in any direction causes "blur" before eyes, accompanied by momentary sensation of confusion; moving objects, cars, smoke, etc., cause same sensation. Constant pressure on top of head; not a pain but a sensation of weight, more severe at times than at others. For past few months constant tinnitus with deafness of right ear.

Examination: B. $P._{120}$ mm. Urine negative. Temperature normal. Neurological examination negative, (Dr. C. C. Beling). Positive von Pirquet's tuberculin reaction. Suspicion of Stellwag's symptoms in both eyes; looking directly at object causes a contraction of the levator palpebra superioris, showing a line of sclera above cornea. Vision normal. Fundi normal, but contraction of the color fields with "interlacing" of colors. Right ear: Whisper heard at one inch; voice at two feet. C_{128} a. c. not heard; b. c. normal. C_{512} a. c. not heard; b. c. reduced two seconds. C_{2048} a. c. reduced eight seconds. Left ear whisper heard at four feet. Vestibular apparatus; Right ear; caloric (cold) no reaction. Rotation towards left, nystagmus twenty-four seconds in duration. Rotation towards right, nystagmus twenty-five seconds duration. Rotation in either direction produces but a momentary sensation of dizziness.

February 12, 1912, (five months later): In spite of treatment, patient has become progressively deafer, at times hearing much better than at others. Right C_{128} a. c. not heard; C_{1024} a. c., heard, but very much diminished. Koenig's rods heard up to 20,000 v. s. Closure of poor ear does not cause increase of sound of tuning-fork held on vertex. Vestibular apparatus: Both ears; caloric

(cold) gives no reaction or vertiginous sensation. Following double caloric tilting head forward and away from affected side makes patient dizzy with some nausea. After double caloric test left pupil larger than right; both rather dilated, pupil apparently made larger by lying down.

February 20, 1912: Lumbar puncture performed, fluid under great tension, about 20 ccm. withdrawn. Examination of fluid by Dr. Harrison S. Martland: "Quality clear, no flocculi. Noguchi's globulin reaction and Kaplan's modification of the butyric acid reaction; no increase in globulin. Microscopic examination: scanty number of lymphocytes, no tubercle, no other bacteria. Conclusion: normal cerebro-spinal fluid." Following the lumbar puncture no relief of aural symptoms.

February 28, 1912 (one week later): Right ear with noise apparatus; voice heard at one foot; C_{128} a. c. not heard; b. c. greatly reduced; C_{512} a. c. not heard; b. c. reduced thirteen seconds; C_{2048} a. c. not heard. Left ear, whisper six inches, voice five feet. C_{128}a. c.>b. c.; a. c. reduced nine seconds, C_{2048} a. c. reduced six seconds. Vestibular apparatus: caloric test (cold) in either ear, no reaction. Caloric (double) nystagmus of momentary duration immediately after water stopped, probably comes from left vestibular apparatus, not associated with any vertiginous sensation.

March 23, 1912: Total deafness of right ear. Vestibular apparatus; cold and galvanic tests fail to give reaction in either ear.

April 20, 1912: Operation: cerebellum over right side exposed, dura not exposed.

June 6, 1912: Since operation absolute relief of all vertiginous symptoms. No pressure sensation on top of head. No blur before eyes on movement of head. Patient regards himself as perfectly well. Examination. Color fields of both eyes which had repeatedly been taken and prior to operation always found greatly contracted, with "interlacing," now normal of left eye, slight contraction of right; no color interlacing. Right ear; with noise apparatus, whisper heard at one foot, voice three feet. C_{128} b. c.>a. c.; a. c. reduced eight seconds. C_{512} b. c.>a. c.; b. c. reduced six seconds; C_{2048} a. c. reduced four seconds. Left ear: voice ten feet; C_{128} a. c.>b. c.; a. c. reduced two seconds; C_{512} a. c.>b. c.; b. c. reduced six seconds; C_{2048} a. c. reduced three seconds. Vestibular apparatus: rotation towards left, nystagmus twenty-four seconds; caloric (cold) right ear no nystagmus.

The three cases, taken together, demonstrate many points of differential diagnosis between labyrinthine and retro-labyrinthine lesions.

In G. M., the long continued, spontaneous, horizontal nystagmus towards the affected side suggested intra-cranial origin. With this he invariably fell in the same direction, and this in all positions of the head. The diagnostic value of this absence of the normal relation between the direction of the falling, the direction of the nystagmus, and the position of the head in intra-cranial lesions has been fully demonstrated by Bárány.

F. B. presented "disassociation" of the vestibular and cochlear portions of the nerve. After the decompression, while the cochlear portion of the nerve was functionating, shown by her ability to hear, the vestibular apparatus was not excitable by any known method.

The importance of "disassociation" in the diagnosis of retro-labyrinthine affections, was described by Whitmaack and Frey. While several cases of disassociation from toxic affections of the nerve have been reported, as far as I am aware no case has been previously recorded of "disassociation" having been caused by restoration of the cochlear functions, alone by operation.

G. M. and J. J. H. had the great dissimilarity between the degree of the vertigo complained of and that produceable by artificial stimulation of the vestibular apparatus, to which Bárány has called attention. J. J. H., in particular, was subject to "dizzy attacks" severe enough to incapacitate him; but turning produced practically no dizziness.

Both G. M. and J. J. H. presented a condition, viz.: reduced reactionability to cold and to the galvanic current of the vestibular apparatus of the apparently unaffected side, the presence of which, in intra-cranial lesions, has not, as far as I know, been previously described. This condition, if generally present, may be of service in diagnosing increased intra-cranial pressure involving the auditory apparatus, possibly at an early stage.

G. M., when first seen had, I thought, a hyperesthesia of the vestibular apparatus of the affected side, as cold water syringed into the affected ear had a marked effect, but even at this stage it was impossible to produce any reaction by cold water when applied to the unaffected ear. Later neither cold nor galvanic current produced any effect. In J. J. H. it was impossible at any stage to cause any reaction by either cold or the galvanic methods applied to either ear, although double caloric at times apparently had a momentary effect.

Both G. M. and J. J. H. reacted to turning during the entire course of the disease. In G. M., turning, in the early stages, pro-

duced a nystagmus of unusual strength and duration. Later, the nystagmus was very slight, exemplifying the early hyperesthesic and later diminished excitability described by Neumann as occurring in different stages of intra-cranial lesions involving the vestibular apparatus. In J. J. H., turning in either direction produced nystagmus of rather short but equal duration.

Reduced excitability to cold and to the galvanic current, of the apparently unaffected side, associated with induced nystagmus of equal duration from turning, in an intra-cranial lesion, although apparently paradoxical, is logically to be expected from the known, secondary reactions occurring months after the total destruction of the peripheral organ by disease. While the immediate effect of destruction of the labyrinth is to cause a great difference in the duration of the induced nystagmus to turning in different directions, months later, it is found that the duration has become equal. On this fact Ruttin diagnosed a very old, total destruction of one labyrinth. Operation confirmed this. In the same class of cases, reduced excitability of the normal labyrinth to cold is recorded by Bárány. Reduced excitability of the unaffected side to cold, and equal duration of the induced nystagmus from turning, can then be regarded as manifestations of the end result of the central mechanism in its re-establishment of the disturbed compensation following destruction of one peripheral organ. Logically, the same should be much earlier expected in a slowly growing lesion of one side of the central mechanism itself.

As with the vestibular apparatus, so also with the cochlear apparatus, careful examination in the case of J. J. H. revealed a beginning deafness of the apparently unaffected side, although he did not complain of such and apparently was unaware of its presence.

The study of these three cases leads me to believe that in intra-cranial lesions of the posterior fossa, there may occur early reductions of the excitability of the vestibular apparatus, not only of the affected but of the unaffected side and perhaps an oscillation of the function of the cochlear apparatus of the unaffected side; all due possibly to an edema of the nerve-sheath, which conditions may be revealed by repeated, careful examinations by qualitative tests and can be relieved, at least temporarily, by decompression.

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15 Lombardy Street.

RESONATORS, WITH SPECIAL REFERENCE TO THE SCHAEFER APPARATUS.*

DR. ROBERT SONNENSCHEIN, CHICAGO.

Often new methods and appliances are perfected and employed in one part of the world but for some reason or other the knowledge thereof is not rapidly disseminated, either: (1) because the original articles are published in obscure or foreign journals; (2) because if of the latter class, they may not have been translated into English, and are, therefore, inaccessible to many readers; and lastly (3) because the papers are often not abstracted in our journals. When this appears to be the case it seems not only proper but advisable to call attention to such publication or invention.

So far as I am aware, no article in English has, at least up to 1912, appeared dealing with the apparatus in question, nor have I learned at the time of this writing of the presence of another set of the Schaefer resonators in Chicago. Please pardon, therefore, the introduction of the subject, even though the practical utility of the instrument may not yet have been fully demonstrated nor appear at first sight very great.

To properly appreciate and intelligently apply a subject like otology, and particularly the functional testing of the ear, requires, it would seem, some knowledge of acoustics which embraces among other topics, the subject about to be discussed.

In the consideration and application of resonance and resonators, we have a most interesting and important field bearing on the appreciation of many phenomena connected with hearing and with the voice, besides offering those who are concerned with the study of acoustics per se a splendid opportunity of solving many different questions. Resonators have been used in various ways, for instance: by Helmholtz and others for the analysis of tones, particularly of the different vowels; by Wien for the determination of tone intensities; by Abraham and Schaefer for the purpose of solving the difficult problem of "interference tones"; by Schaefer and later by Waetzmann to furnish proof of the existence of objective physical combination-tones in the sounds produced by vibration of membranes or diaphragms. It seems that a useful application of resonators would consist in testing therewith the various forks which we buy in order to be certain of their pitch should any doubt

*Read at the meeting of the Chicago Laryngological and Otological Society, November 19, 1912.

exist and no other accurate forks be at hand with which to compare. A few years ago Edelmann constructed and introduced a continuous series of resonators evidently intended to supplement the Bezold tuning forks. This will perhaps lead to the former becoming a part of the otologist's armamentarium.

Resonators, be it said, are instruments capable of and used for selecting out special sounds for reinforcement. Resonance, or sympathetic vibration, which is the reinforcement or intensification of sound due to the union of direct and reflected waves, depends upon the principle that a number of slight impulses properly applied will finally create a considerable momentum, as seen in the well-known fact of giving impulse to a swing or a pendulum at the proper phase of the oscillation. When, therefore, a vibrating body is brought near the corresponding resonator the latter is caused to vibrate in its fundamental tone. To induce a rigid body like a tuning-fork to respond to or resonate with another fork, or other sounding body, requires that both objects have exactly the same number of vibrations per second, or that the vibration number of one is a simple multiple of the other. When, however, a more elastic substance such as a column of water or air is used as a resonator, the two sounds need not be absolutely in unison, but should be nearly so. In most resonators a column of air is employed, as is also the case in the Schaefer apparatus. Although in my possession for the past year, it was for certain reasons impossible to do more than use the apparatus on a few patients and attempt some tuning-fork tests, not enough in number or of sufficient quality to signify anything. Further investigation will be made and the findings reported if possible.

To produce a resonator for any one tone is a comparatively simple procedure. A lamp chimney, a tube of cardboard or a bottle may do. By placing in water a cylindrical glass or metal tube open at both ends, and having a length of approximately a meter, and a diameter of a few centimeters, it can be made to resonate for tones ranging from about 100 to 3000 vibrations per second depending upon the depth of the immersion. The disadvantage, however, of these water resonators lies in the fact that the ear of the person to be examined cannot easily be connected with the node of the air wave which is formed at the surface of the water column. For this purpose the spherical resonators of Helmholtz are very serviceable in that they have opposite the sound opening a small funnel-shaped open tip or prolongation which can easily be inserted into the ear.

If it is desired to pick out a certain tone from a sound-complex, the larger opening of one of these Helmholtz resonators need only be directed toward the source of the sound, and the corresponding tone will be distinctly heard. If the sound is not especially loud, alternate covering and uncovering of the smaller opening by means of the finger will often accentuate it, by producing a rhythmic increase and diminution of its intensity. This is due to the fact that a resonator open at both ends reinforces better a higher tone than one open only at one end. In other words, resonators of this type are of higher pitch than those in which one end is closed. On the other hand a resonator is of deeper pitch: (1) the larger the air containing area, and (2) the narrower the sound opening (Schalloch) happens to be.

Schaefer advises using resonators in this analysis of sound without insertion into the ear because the instruments are caused to vibrate by very slight disturbances, such as faint noises or sounds. The fundamental tone of the respective resonator is thus produced, giving confusing results. But this very sensitiveness of resonators can be utilized in otology, for the introduction of the apparatus into the ear will serve as a last resort in the hearing of an otherwise inappreciable sound. Therefore, perhaps, the diagnosis of total deafness should not be made until a fairly loud sound intensified by the corresponding resonator fails of perception.

Tones of medium pitch are the ones most intensely reinforced, the very low and the very high ones much less so. Schaefer, Koenig and Helmholtz maintain that there is no practical value in producing resonators with less than a hundred double vibrations, that is about A (108 v. d.). It is possible to produce resonators for sounds of 2000 to even 4800, (dis^5) vibrations, but practically this fact is not very important. Helmholtz used his spherical resonators up to d^3 (about 1150 v. d.) and claimed that "smaller spheres were not feasible."

Each Koenig or Helmholtz spherical resonator gives a maximum reinforcement for one certain tone, but less for sounds just above or below this one. There are therefore certain tones lying between succeeding resonators which are not reinforced to their maximum. For instance in the Koenig series of nineteen spherical resonators (not to be confused with his series of fourteen cylindrical tubes), there are sixty-four vibrations between the reinforcement maxima of the various resonators, so that each one must not only give the greatest resonance for its

own tone but also serve for sounds thirty-two vibrations above or below this. In the small and in the one-lined octaves, however, they do this rather defectively; an important fact to be considered when good reinforcement of all tones is desired.

If a separate resonator were desired for each tone or half tone between c (128 v. d.) and c^3 (1024 v. d.) it would require a large number of instruments, which is impossible from a practical standpoint.

Schaefer claims that the ideal instrument is a "continuous or universal resonator apparatus, adjustable for any desired tone between at least c (128 v. d.) and c^3 (1024 v. d.), one producing maximum reinforcement of every tone, easily manipulated, compact, and comparatively cheap." These qualities are held to be embodied in his new apparatus.

These resonators are four in number of different lengths but the same diameter, cylindrical in shape, and made of brass. One end is open, the other closed by a plate having a central aperture. Over the latter is a conical extension intended to be placed in the meatus auditorius or to be connected with tubing for introduction into the ear. For occluding the small opening when the resonators are not to be inserted in the ear, rubber plugs are provided.

Each resonator tube fits accurately into another cylinder but can be moved in and out. The inner tube is graduated in millimeters, so that the length of the resonators, depending on the amount that the inner tube is withdrawn, can at a glance be read. At the same time the tones for which the resonator acts at different lengths are indicated by letters giving the notes of the scale. As is customary in Germany, H is used to designate the b of our scales. The resonators are graduated to correspond to the tones of the temperate scale, based on the tone of a^1 (435 v. d.) at a temperature of 18° C. (about 64.4° F.). Experiments have shown, however, that at ordinary room-temperature varying somewhat from 18° C., no correction in readings is necessary. The range of these resonators is from about A (108 v. d.) to a little above c^3 (1024 v. d.).

The graduation is also based on the assumption that the smaller opening is closed when the resonators are used. When applied in the ear, the drum acts as obturator, but when used outside the ear the smaller aperture should be occluded with a rubber plug or end of a finger. Otherwise inaccurate results will be had, for a resonator open at both ends is of higher pitch than one in which only a single end is open, as was previously

pointed out. Judging by a few experiments this difference in pitch amounts in most cases to about one-half of a tone. It has been shown that the freely movable membrana tympani acts just as well in closing one end of the resonator as does the rubber plug. It will be interesting to see what effect the presence of a perforation in the drum membrane has as regards the pitch of the resonator used.

Comparing now the Schaefer apparatus with those of others, we find that Koenig's set of fourteen cylindrical tubes covers a wide range from G to e^3 but is very expensive and rather bulky. Edelmann's new resonators consist of five spheres each supplied with twelve to eighteen diaphragms, has a wide range, but is also rather expensive. Schaefer's set, as above stated, covers a range great enough for all practical purposes, is accurate, quite compact, easily adjusted, and much lower in price.

There has been considerable dispute regarding the advantage of spherical over cylindrical resonators; Helmholtz supported by Watson and others claiming that the former give a purer tone and a more powerful resonance. Schaefer on the other hand disputes this statement, and claims that even granting it the difference is so slight as not to count from a practical standpoint.

In conclusion be it said that resonators can be used for various purposes: (1) In physical research in the analysis of tones, etc.; (2) in testing tuning forks to see if the actual tone is the one claimed to be present; (3) for determining the pitch of unmarked forks, or that of any other sounding body whose tone comes within the range of the resonators employed; (4) and last, but not least, for testing the absolute duration of hearing. With the corresponding resonator inserted in the ear, a tuning fork, no longer heard alone, will still be appreciated; but when its sound ceases to be heard despite reinforcement, the limit of hearing has been reached. To determine actual deafness forks not at all heard alone can thus be used with resonators to establish the diagnosis.

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SOME ORIGINAL ENDOSCOPIC METHODS.*

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During the past few years so many papers have appeared on direct laryngoscopy, bronchoscopy and esophagoscopy, that it seems almost superfluous to add another to the list. The constant introduction of new instruments, however, indicates that laryngologists are still seeking simpler methods which will enable them to work successfully in these fields. To try to help in the simplification of the work and to add my experiences to the rapidly growing literature are my excuses for submitting this paper to the American Laryngological, Rhinological and Otological Society. By way of preface I wish to say that to learn direct laryngoscopy, bronchoscopy and esophagoscopy well is one of the most difficult problems in surgery; that, once mastered, they are fairly easy and can be successfully used in practically every patient free from deformity.

In order to become skillful much practice is required, which necessitates connection with a large general or special hospital where material can be obtained in abundance. Many hours must be spent in learning proper methods of anesthetizing and in manipulating the various instruments. After long practice a certain knack of handling the instruments, so as not to cause pain, is acquired. It seems to me that the real reason of the want of popularity of these methods is the multiplicity of instruments. When one enters a modern instrument-store and sees the large number of instruments apparently required for the work, one is discouraged to say the least. As a matter of fact successful work can be done with a few instruments.

It may be said, as a general rule, that one who has mastered direct laryngoscopy will have little trouble in passing the bronchoscope or the esophagoscope. When the laryngologist has become expert in the use of the tubes, he will discard the indirect method for operative procedures. The fact that he sees the lesion directly, that with practice he acquires a proper perspective, gives him an advantage over the mirror. Since perfecting my own methods I have not used the mirror for any operative procedure in the larynx. I feel that I can do better and quicker work and that lesions difficult or

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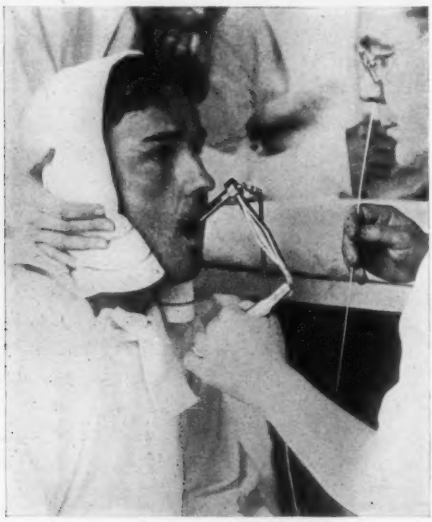
impossible of removal by the mirror can be successfully handled through the tube.

Before describing the methods which have greatly simplified direct laryngoscopy for me, I wish to refer briefly to two positions of the head which have had their origin in America. The "Boyce position" was worked out by Dr. J. W. Boyce of Pittsburg and is fully described in Jackson's work on "Tracheo-bronchoscopy." The head is lowered over the end of the table and held in the proper position by an assistant. Jackson emphasizes the fact that the head must be held just right, which necessitates a trained assistant. Such a



1. Direct Laryngoscopy. Head straight. Local anesthesia.

man can be obtained where one works constantly in the same hospital, but if he should be so situated that he could not get his assistant, he would be at a great disadvantage. When the "Boyce position" is used, the operator sits on a low stool in a more or less cramped position and is dependent on the man who holds the head. The speculum is introduced with the left hand and when the epiglottis comes into view, it and the base of the tongue are pulled up and a view of the larynx obtained.

The strain on the forearm in holding the speculum is so great that the instrument cannot long be held in position and one must operate quickly, which endangers the integrity of normal tissues.

In April, 1908, Mosher described the "left lateral route," which consisted in turning the patient's head to the left until the cheek almost touched the plane of the table and then flexing the head on the chest. A special spatula was passed down between the left bicuspid teeth, the tongue pushed to the side and the epiglottis raised, which gave a good view of the larynx. I believe this method was used first in examining the upper end of the esophagus and was later applied to the larynx. Mosher's first instruments were too large and cumbersome for use in every case. He has since had them made smaller.

2. Direct Laryngoscopy. Head forward, giving as good a view as Figure 1.

In the summer of 1908 I had under treatment multiple papillomata of the larynx in a child, 4 years of age. I had made the diagnosis with the head in the "Boyce position," but had not been able to do much in an operative way. I tried Mosher's method, unsuccessfully. I then conceived the idea of passing the old Jackson speculum between the incisor teeth with the head straight on the table. A good view of the larynx was obtained. Since then I have used no other method in the examination and treatment of the larynx in children and in adults under general anesthesia. Before describing the straight method as opposed to extension and flexion, it will per-

haps be better to mention direct laryngoscopy in the sitting position. From an extensive experience with the position that I will describe, I believe it is possible to examine practically all adults under local anesthesia. If the patient has a sensitive throat or seems at all nervous, I make it a rule to give two or three days before the examination large doses of bromides which do good in controlling the cough-reflex and in allaying nervousness. On the day of the examination the patient is instructed to eat a good lunch, since a full stomach seems to have some effect in preventing poisonous symptoms from the anesthetic, and to report at the hospital at a certain hour. A half

3. Direct Laryngoscopy. Head straight on table. Girl, 17 years old. No anesthetic and patient not held.

hour before the examination the nurse gives the patient a hypodermic injection of morphin (⅛ to ¼ gr.) and atropin 1/150 gr.). The patient is seated on a low stool with the head slightly extended and supported—not held—by a nurse. Formerly I used cocain for anesthetizing, but two cases of rather serious poisoning led me to substitute alypin which seems to work as well. The pharynx, base of tongue and epiglottis are deadened with a curved applicator. In about 5 minutes the direct laryngoscope is introduced and the anesthetization completed through it.

I wish to emphasize the fact that when the laryngoscope is ready for introduction, the head should be slightly extended and turned to

the right or the left, according as the operator may desire to enter the mouth from the left or the right side. With the mouth open the instrument is introduced between the bicuspid teeth and as it passes down, the tongue is pushed to the opposite side. When the epiglottis comes into view, the spatula end of the laryngoscope is passed behind it and slight pressure upward on the handle suffices to bring the larynx into view. If the anterior commissure is not seen, the nurse is told to push the head forward until the straight position is assumed when all parts of the larynx are usually seen clearly. It is remarkable how little force is exerted on the instrument in this

4. Direct Laryngoscopy. Boy, 6 years old. No anesthetic and patient not held.

method. In some cases the weight of the speculum almost brings the larynx into view. The right hand is free for any operative procedure.

One great advantage of the position is that with the instrument in a straight position, the head can be brought from left or right to an erect posture so that small tumors of the cords can be approached from the side which makes removal easier. Other advantages are the shortening of the distance from the teeth to the larynx, the slight danger of injuring the teeth, pushing the tongue to the opposite side and the complete relaxation of all neck muscles. With this

method and the Jackson instruments. I have never failed to get a good view of the larynx at the first sitting. It can be confidently asserted that in most patients operations can be successfully performed at the first attempt. This method will be found far superior to the passage of the speculum between the incisor teeth which compels more extension of the head, the pressure of the tongue against the floor of the mouth, more force on the instrument to see the larynx with frequent failure to see the anterior commissure. There is also greater danger of injuring or displacing teeth.

In children under 6 years of age, I always use the straight method of direct laryngoscopy without anesthesia of any kind for examining and operating. The method of procedure is as follows: With no preliminary preparation the little patient is securely pinned in a sheet

5. Direct Laryngoscopy. General anesthetic preparatory to passing bronchoscope.

so that the arms and legs are practically immovable. He is then placed flat on the table with the head in the normal, straight position. An assistant stands at the head of the table and holds the head so that it cannot be moved while nurses look out for the arms and legs. The operator stands at the left of table facing the patient and holds the Jackson speculum in the left hand. The mouth is forced open, if necessary, with the thimble and the instrument is passed straight down between the incisor teeth. When the epiglottis comes into view, it is hooked up with the spatula end and by raising the handle slightly the larynx is seen. In most cases the entire larynx is seen; if, however, the anterior commissure does not come into view, the thyroid cartilage is pushed back by an assistant. The en-

tire procedure takes a few seconds. There is no traumatism and the child leaves the table unhurt. I have made repeated examinations in the same patient to watch the progress of papillomata and have yet to see any bad results. The method is simple, easy and quick and gives the best possible view of the larynx.

It may be of interest to refer to the modified Jackson laryngoscope. In my earlier work I used his old laryngeal speculum which I believe is now obsolete. I wish to say that it is a most valuable instrument for the examination of the upper end of the esophagus in children in both the extended and straight positions. While the speculum worked well it was a little too long for small children. To obtain an instrument more suitable for a child's throat, I had the

6. Passing bronchoscope, head straight on table. Bronchoscope is in trachea.

vertical part of the handle of the slide speculum cut off and a screw arranged in it so that it can be attached or detached at will. With detached handle the speculum is ideal for the straight method in children with or without anesthesia. With handle attached, the instrument is ready for use in the sitting position.

Bronchoscopy: I think all bronchoscopists will admit that the most difficult stage in bronchoscopy is in passing the tube between the vocal cords. Once below the cords, it takes no special skill to push the tube further down. The usual way and, so far as I know, the only way of passing the bronchoscope, is with the head in extension either in the sitting position under local anesthesia or over the head of the table under general anesthesia. In extension under general anesthesia the same difficulties are encountered as in direct laryngoscopy. In order to prevent the strain on the forearm and

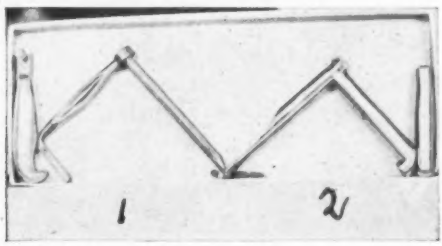
the necessity of overcoming the tenseness of the neck muscles, I attempted to pass the bronchoscope with the head in the straight position. With the head flat on the table the laryngoscope is passed as above described. When the larynx is brought into view, the bronchoscope is passed through the speculum until the vocal cords are reached. The eye is transferred to the end of the smaller tube, which, under the influence of a slight twisting motion, slips between the vocal cords. The slide speculum is now removed, the bronchoscope left *in situ*, supported by an assistant, the head gently lowered over the end of the table and the examination proceeded with as in extension. In passing the bronchoscope the operator stands to the left as in direct laryngoscopy.

7. Bronchoscopy and esophagoscopy. Cushion removed and head lowered to plane of table. Head under complete control of operator.

Some time ago it occurred to me that it might be possible to pass the bronchoscope and examine the trachea and bronchi without lowering the head over the end of the table, thus doing away with the necessity of a trained assistant and giving the operator more room and allowing him a more comfortable position while working. In this method the patient is placed on rather a high cushion while the head is supported by another cushion. The laryngoscope and bronchoscope are passed in the straight position as described above. With the bronchoscope in position the cushion under the head is removed and the head allowed to drop to the plane of the table. If the distance from the cushion to the plane of the table has been properly estimated, the head is under complete control of

the operator and no assistant is needed to move it. I have found that side movements are unnecessary, while the up-and-down movement is regulated easily by a small pillow. With the head in the proper position the right and left bronchi with their branches are rapidly explored. In this position, with the patient properly anesthetized, one is surprised how little extension is necessary for successful work. The operator sits on an ordinary stool at the head of the table and is much more comfortable than with the head over the end of the table.

Bronchoscopy in the sitting position: Under local anesthesia the laryngoscope is introduced as above described. With the head slightly extended and turned to the side, the entire larynx is seen clearly. The bronchoscope is passed through the laryngoscope and, without regard to the breathing or the movements of the cords, is gently pushed into the trachea. The procedure takes only a few



8. Instruments used in direct laryngoscopy and upper esophagoscopy. 1. Jackson's old speculum, and 2, separable speculum with modified handles.

seconds if the larynx is properly anesthetized. I now seldom use the laryngoscope for passing the bronchoscope in the sitting position. After anesthetizing the larynx I pass the bronchoscope from the side with the patient's head almost straight. With the end of the instrument the epiglottis is pulled forward and the bronchoscope easily passed between the cords. A point of great importance in all these positions of the head is the fact that larger tubes can be passed than in extension.

Esophagoscopy: The examination of the upper end of the esophagus can be made in two ways. With the head over the end of the table Jackson's old laryngoscope in children is passed behind the larynx, which is lifted up and a good view of the esophagus obtained. The second method is that of Mosher which has been

described above. His instrument is used and is passed into the esophagus which opens up to the clavicle. A third method which can be used easily and quickly in children without anesthesia, is as follows: The child is pinned in a sheet and placed on the table as in the straight method of direct laryngoscopy. The head is held and the modified laryngoscope is passed until the larynx comes into view. The spatula end of the instrument is now passed behind the larynx and slight pressure on the handle suffices to open up the upper end of the esophagus for an inch. In this way a stricture or a foreign body can be quickly diagnosed and the foreign body removed as easily as with the head in extension. The operator stands during the examination as in direct laryngoscopy. In adults under general anesthesia the same method may be used in examining the upper end of the esophagus.

In all the methods described no complicated instruments are used. My armamentarium for examining the larynx and esophagus consists of a thimble and Jackson's two laryngoscopes, the old speculum and the modified laryngoscope. The greatest advantage of the methods is the fact that one does not need trained assistants. I have worked successfully in hospitals where the assistants had never seen such work.

To illustrate the ease with which the methods can be used, I wish to cite briefly a few cases which have been treated during the past year:

Case 1: A little girl, 2 years old, was brought to me from Winston-Salem, N. C., with the history of having swallowed a chicken bone. Four days before, while eating soup, she suddenly had a choking spell during which she nearly died. Dr. T. W. Davis located the bone in the larynx and attempted to remove it with the mirror. He did not succeed and brought her to the Presbyterian Hospital for examination with the direct laryngoscope. The patient was placed on the table with the head in the straight position, the laryngoscope passed and the bone located between the vocal cords. It required only a few seconds to grasp the foreign body and to remove it with Pfau's forceps. Recovery was uneventful. The bone was so tightly wedged between the cords that some force had to be used to dislodge it.

Case 2: Dr. J. L. Hirsh referred a boy, 5 years old, to me for aphonia of long standing. Since it was impossible to examine the patient with the mirror, he was examined at the hospital with the head in the straight position. No difficulty was experienced in getting a good view of the larynx. The diagnosis was multiple papil-

lomata involving chiefly the anterior part of the larynx. A few days later a large mass of papillomatous tissue was removed with the head in the same position without anesthesia. This patient has been operated upon several times and applications of alcohol are now being made to shrink up the tissue in the anterior commissure. None of these examinations have taken more than a few seconds and the little patient does not mind them.

Case 3: Mrs. R. N., 30 years old, was referred to me by Dr. M. L. Todd for huskiness of the voice following the discovery of a tubercular lesion at one apex. The patient was so nervous that a strong cocain solution had to be used to get a view of the larynx with the mirror. The posterior wall showed a decided thickening. A few days later the patient was sent to the hospital and the tissue removed with the head slightly extended and turned to the right. The laryngoscope was introduced between the left bicuspid teeth.

Case 4: Mr. N., 26 years old, was referred to me by Dr. St. Clair Spruill for huskiness of the voice of seven years' standing. He had previously had three unsuccessful operations with the mirror for a tumor of the left vocal cord. The growth was situated on the cord near the anterior commissure. Under cocain anesthesia the papilloma was removed at the first sitting with the head slightly extended and turned to the left.

Case 5: In December, 1910, a patient was referred to me by Dr. F. M. Winchester, of Charlotte, N. C. Five days previously he had aspirated a scarf-pin which proved to be in the right bronchus. Under general anesthesia with the head straight on the table the bronchoscope was passed. The head was then lowered over the end of the table and the examination proceeded with.

Case 6: A boy, 8 years old, developed dyspnea for which no cause could be found. Under general anesthesia the bronchoscope was passed with the head in the straight position. The head was then lowered as in the "Boyce position."

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FOREIGN BODY (INSTRUMENT) IN THE SPHENOID SINUS.*

DR. ISAAC M. HELLER, NEW YORK CITY.

Foreign bodies have been lost in almost every conceivable cavity of the human body but until recently the sphenoidal sinus has been happily free. This is owing to its peculiarly protected position in the nose with its small ostium high up behind the middle turbinate.

Latterly, however, since the work of Onodi, Hajek, Killian and others has shown us the surgical importance of this space and the frequency with which it may be the seat of pathological process, the sphenoidal sinus, too, has proved its possibility as a receptacle for extraneous objects. Oppikorfer, in 100 autopsies exposing 200 sinuses, found stomach contents nine times or four and one-half per cent, five times on one side only and twice on both. He further quotes Wertheim, Minder and Martin who met with similar conditions and who claim that the vomitus entered the cavities during the life of the patient. Oppikorfer on the other hand, believes it to have happened after death or shortly before with the patient in a profound coma. He bases his contention on the fact that in all the cases reported, the mucous membranes of the sinus in some were perfectly normal, in less than one-half there was a catarrhal inflammation and none contained pus. He thinks it scarcely possible that stomach material could remain in contact with so sensitive a tissue as the lining membrane of this cavity for any length of time without causing a marked purulent reaction. Further, in two of his cases which were reliably watched during the illness and where positively no vomiting had occurred during life, the above condition was found on section. This, he states, was due to the shaking up of the cadavers during transit.

Tunis[2] also reports the results of one hundred autopsies exposing two hundred sinuses in the pathological department of the Allgemeines Krankenhaus in 1909. The writer was in Vienna at the time and had the pleasant privilege of witnessing some of the sections and assisting in going over the case-histories. In none of these was anything of a foreign nature found. These, of course, were taken at random and represented all the usual causes of death, which tends to bear out Oppikorfer's

*Read at the meeting of New York Academy of Medicine Section on Otology and Laryngology, May 22, 1912.

contention. The ostium sphenoidale must be extremely large and surrounding parts relaxed or perhaps missing as in a marked case of atrophic rhinitis, for stomach contents to enter this recess during life.

Chiari[3] reports a case of a man brought to the surgical division of the Allegemeines Krankenhaus with a bullet in his sphenoidal sinus as shown by the Roentgen ray. This the professor removed by the nasal route and the patient recovered. It is the first time, so far as I am able to ascertain, that a bullet had been taken from this sinus through the nose.

Voislawsky[4] is the first to record a foreign body in the sphenoid as the result of operative interference. Briefly it is as follows: Man, aged 38, with pan-sinusitis, on February 10, 1910, had his middle turbinate and ethmoid cells removed. Following this, while local applications were being made, the cotton became detached from the applicator and diligent search failed to find it. The doctor was called from the room and on his return was shown a piece of cotton which patient had blown from his nose during the absence and which was thought to be the lost swab. On October 10, while violently blowing his nose, the patient expelled a bit of cotton which looked as if it had been roled on an applicator.

On April 22 of the following year, this same patient, who was a physician, having a bad cold introduced some adrenal solution on a cotton swab into the right nostril to reduce the congestion of the inflamed mucous membrane. He again lost the cotton and on May 22, Dr. Voislawsky removed it from the sphenoidal cavity by means of a bent probe after a stay of just one month.

Charlotte F., aged 19, milliner, called November, 1911, complaining of more or less difficulty in nasal breathing, worse at night. She had been to two clinics where operation had been advised. The septum was markedly deviated to the left impinging on the turbinates while the concavity on the right was almost completely filled with a large bullous middle turbinate. After explaining to the patient the objects and necessity of operating she reluctantly consented. On December 5, 1911, under cocain and adrenalin, I removed the left middle turbinate. This was so large and crowded between the septum and external wall that I was unable to remove it en masse and it came away in two portions. Then I noticed a small opening in the anterior wall of the sphenoid through which the glistening mucous membrane lining was plainly seen.

The patient was of an intensely neurotic temperament who flinched each time an instrument approached the nose and kept up a continuous stream of inquiries of "what are you going to do now?" interspersed with expressions of fear. Hemorrhage was moderately brisk and after a short wait it was seen that nothing remained but to smooth off a few rough projections from the stump. While doing so with the Hartmann alligator forceps (Figure 1), Miss F. suddenly twisted her head to one side and I felt something give way in the instrument. On its withdrawal, the terminal section was found missing (a—Figure

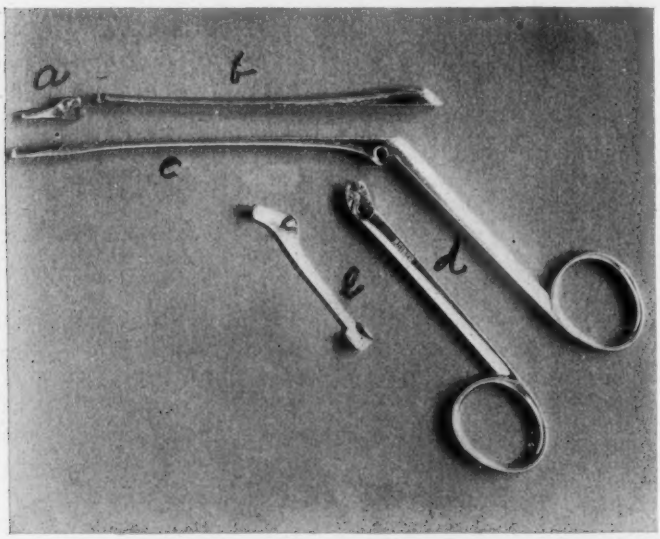

Figure 1.

1, having become disarticulated from b—Figure 1). The patient saw this too, which, as can be readily imagined, did not tend to allay any of her previous apprehensions and nervousness. Meanwhile hemorrhage was fairly free and diligent search failed to find the "missing link." After working until it was clear nothing further could be accomplished under those circumstances and fearing that manipulating in the dark might push the part into the antrum or orbit, the nose was lightly packed and patient sent home. Thirty-six hours later the gauze was removed but clots and oozing precluded a satisfactory in-

spection of the field. On December 8, two x-ray pictures, antero-posteriorly and laterally were taken, but were too faint to be of any assistance. On December 10, nose was again inspected and probed without touching anything of a foreign nature. Oozing had been more or less continuous but no hemorrhage.

Figure 2.

At 11 o'clock that evening she suddenly started to bleed profusely from the right side and continued until 4 a. m., when the flow stopped spontaneously. Patient came to the office later that morning but owing to the recent hemorrhage nothing was attempted. On December 16, Roentgen pictures were taken

again and this time successfully as shown in Figure 2. These proved clearly the presence of the instrument in the right sphenoidal sinus.

Our course was now plainer. As long as the body lay in this cavity probably no harm would ensue by waiting until all reaction had subsided. Therefore she was advised to return to her work particularly as her busy season was about to start. She reported at bi- or tri-weekly intervals for control when it was noticed that granulations were springing up about the entrance to the sphenoid. A probe was passed through these readily, but failed to touch the corpus alienum.

On May 9, 1912, the second operation was performed. This time to overcome the patient's nervous excitability, she was given morph. sulf. gr. ¼, hyoscine hyd. gr. 1/100 per hypo. two hours before beginning. It worked almost like a charm. She became much quieter, at times somnolent and I believe I was able to use more cocain than had the hypnotic not been given. Free use of epinephrin shrank the granulations decidedly and with Hajek's sphenoidal forceps the anterior wall was taken away close to the floor. A bent probe now touched something metalic on the floor of the sinus and a little manipulating brought it to view. A dressing forceps easily delivered the missing part much to the gratification of both operator and patient. The procedure was painless, took about five minutes, and bleeding was so slight as to demand no packing.

The accident impressed this fact forcibly upon me: When the head is in the usual position for operating on the middle turbinate, especially its posterior half, the anterior wall of the sphenoidal body assumes the position of the floor of the middle meatus. Therefore, should there be a sufficiently large opening in the anterior wall objects dropped from the middle meatus can fall readily into the cavity in question. It is well to remember this fact when pieces of cotton are lost in the nose. The dimensions of the part are 17x6x4 mm.

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SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

(Regular Meeting, November 27, 1912.)

JOHN F. McCOY, CHAIRMAN.

Paralysis of the Respiratory Nerve Due to Circulatory Lesions; With Remarks on Recent Therapeutic Measures. By DR. J. W. GLEITSMANN.

To facilitate the disposal of the subject, the paper was divided into five parts: (1) Brief physiological remarks; (2) Recurrent paralysis from heart lesions in general; (3) Paralysis in connection with mitral stenosis; (4) Aneurysm; (5) Therapeutics.

1. The proclivity of the abductor muscles to paralysis is well known, the reason for it having been explained by Grabower, who by painstaking observations counted the number of terminal nerve fibers of the laryngeal muscles, and found that of all the laryngeal muscles the posticus has the smallest number of nerve terminals, absolutely as well as relatively in regard to its size. Semon believes more in the great vulnerability and the biological differences in the muscular structure of the abductors.

It is known that a recurrent paralysis can change to an abductor paralysis, because the stronger adductor muscles recuperate more quickly than the abductors if the underlying lesion shows a tendency to improvement. Four cases were cited illustrating this, reported by Louis Elsberg, Semon, Landgraf, and the writer.

It has been observed that the glottis is wider in the dead than in bilateral recurrent paralysis, and this is of great importance in explaining some phenomena about which decided differences have existed and probably still exist. The greater width of the glottis in the dead is due to the inaction of all the laryngeal muscles while in recurrent paralysis the external tensor, the cricothyroid muscle, which is innervated by the superior laryngeal nerve, still retains its function, which results in an approximation of the cords.

The position of the vocal cords near the median line after experimental surgical severance of the recurrens, led Grossmann to claim that the glottis stood in the cadavaric position in such cases and that therefore the idea that posticus paralysis alone caused the position of the cords in the median line was erroneous. Grabower showed the fallacy of this contention by his experiments on dogs; and demonstrated that the position of the cords is due to the inability of the thyro-cricoid muscle to retain its function of extension, and thereby adduction of the cords for any length of time, if unaided in its action by the adductors when they are paralyzed.

2. Cases of recurrent paralysis from heart lesions in general were cited from Gantz and Low, and reference was made to reported cases resulting from pericarditis. Pericardial effusion was observed by Bauemler to be the cause of a bilateral recurrent paralysis; the condition disappeared with the absorption of the exudate. The writer said that so far

as he knew this was only recorded instance of a cure of bilateral recurrent paralysis due to organic disease. Fein reported a case of syphilis as the cause of a left recurrent paralysis, as all the symptoms disappeared after specific treatment.

3. Ortner, in 1897, reported the first case of left recurrent paralysis due to mitral stenosis, attributing the paralysis to compression of the nerve between the aorta and distended auricle. This was confirmed by autopsy. Later observations by others demonstrated that the pathological lesions producing recurrent paralysis in mitral stenosis showed a great variety of local conditions, in many instances differing from those in Ortner's case. Kraus reported a case of mitral stenosis, tricuspid insufficiency, and hypertrophy of the right ventricle, the Roentgen ray showing enlargement and displacement of the heart. Autopsy showed that in consequence of this displacement the relationship of the aorta and pulmonalis had changed and that Botalli's ligament exerted traction on the nerve. Fetterolf and Morris have analyzed the results of autopsies of eleven cases found in literature—attributing the recurrent paralysis to direct compression on the part of the auricle or its appendix in seven cases; to cardiac displacement in one; to the effect of persistently patulous ductor arteriosus in one; and to indirect compression acting on the primary artery in two cases. An excellent resume of the subject is published by Garel.

4. The deleterious influence of the aorta upon the recurrent nerve was recognized in pre-laryngoscopic times. Legroux in 1853 spoke of the weakness of the voice, partial aphonia, and hoarseness which he attributed to compression of the recurrent nerve by an aneurysm. The first laryngoscopic observation was made by Traube who reported two cases.

A number of cases of recurrent paralysis are recorded as due to rheumatism, but care must be exercised in this matter as prolonged observation of patients and the use of modern therapeutic measures may lead to finding a true pathological lesion. Levinstein for some time treated a patient with right recurrent paralysis, believing it to be of rheumatic origin, but finally by the use of the Roentgen ray he found it to be caused by an aneurysm of the right subclavia producing compression on the recurrent nerve. Finder reported the case of a patient with recurrent paralysis, aortic aneurysm, and locomotor ataxia, and found in one clinic twenty-four autopsies of cases of locomotor ataxia, over one-third of which had also aortic aneurysm.

Bilateral recurrent paralysis due to aortic aneurysm is rare, and is caused by a very large aneurysm involving the trunk of the anonyma and the subclavia. Bernhard analyzed nineteen cases reported up to 1903.

5. Therapy. Horsley in 1909, reported a case of complete paralysis of the left recurrent due to a bullet injury. This was treated by incision along the sterno-cleido-mastoid, excision of the diseased ends of the nerve, and approximation of the healthy nerve-ends with chromic catgut, muscular tissue being drawn over the suture. Improvement began after two months, and recovery was complete in nine months.

Navratil reported some interesting experiments on dogs, in which he made anastomosis of the recurrent nerve with the descending branch of the hypoglossus, guarding the sutured ends by Foramitti's method. Grab-

ower published an interesting case, which confirmed his statement as to the function of the crico-thyroid muscle. The patient had been operated upon three times for goiter which exerted pressure on both recurrent nerves; the adductors of both sides recuperated, drawing the cords towards the median line, thereby causing dyspnea, which necessitated tracheotomy. Grabower advised neurectomy of the superior laryngeal nerve of one side. After this was done the left cord began slowly to recede from the median line, and a month and a half later the tracheal cannula was removed. Mertens also reports a similar gratifying result from neurectomy of the superior laryngeal. The latest procedure for alleviating unilateral recurrent paralysis was reported by Bruenings to the Society of German Laryngologists, who injected paraffin into the cord, in an attempt to counteract the atrophy and weakness of the paralyzed cord and restore its phonatory position. Of the first three patients treated in this way, two regained their voices, and the third was greatly relieved. A year later he reported five other cases with similar results. He had no ill sequelae, and in 1912 the oldest patient spoke with an almost normal voice.

DISCUSSION.

DR. QUINLAN said that he did not feel prepared to discuss the paper, but that he wished to congratulate the author upon his able research and classical presentation of the subject. All know how difficult these cases are, and the last word in regard to diagnosis and treatment has not yet been said. He had failed, however, to elicit any new note in therapeutics or in the agencies for the relief of these conditions. Unfortunately, he has had from time to time cases of recurrent paralysis, which have one after another defeated his efforts. It was always a pleasure, however, to listen to Dr. Gleitsmann's views and to enjoy the treat he gives his hearers.

DR. FREUDENTHAL said that Dr. Gleitsmann had referred to the greater vulnerability of the abductor muscles, and he himself had been able to prove this law of Semon's some six or seven years ago, when he had examined all the cases of tabes and sclerosis at the Montefiore Home. He had found a great many interesting cases that gave no symptoms at all. If it were not so difficult to examine them he would like to do it again; by repeated examinations he had seen first only a paralysis of the abductor muscles and a few months later, that the whole recurrent nerve was paralyzed.

Dr. Finder had found that one-third of his cases of tabes had some aneurysm, and one should be careful in making a diagnosis of recurrent paralysis not to omit this aneurysm. Dr. Freudenthal said that he always kept in mind the condition of the chest, which in his cases had been examined by various observers. He did not recall more than one or two cases of aneurysm seen by him in connection with this paralysis. In recurrent paralysis the normal vocal cord has to learn how to compensate and go over to the affected side, so as to close up the glottis. He had been impressed by the findings of these patients. People with absolutely normal voice and breathing, showed suddenly a recurrent paralysis.

DR. THURBER said that he had reported once before the case of a man at the Vanderbilt Clinic who had a left recurrent laryngeal paralysis and

had found a way to give himself a good, loud voice by external pressure with his thumb; thus producing the required adduction by external pressure. He discovered how to do this by trying to call at some distance when his head was turned so that his collar made pressure on the side of his larynx.

DR. YANKAUER said that in some cases the diagnosis of intra-pulmonary tumors is not made by the internist, for the symptoms are obscure, and the tumor may be small. Bronchoscopy, however, affords an excellent means of recognizing the causes of this paralysis, for any tumor that is large enough to press on the recurrent nerve would be likely to show in the trachea. The examination of these patients with the bronchoscope, however, requires the observance of certain precautions. Any muscular effort or strain on the part of a patient with an aneurysm is dangerous, and if we do not know the cause of the paralysis we must assume that an aneurysm may be present and consequently avoid subjecting the patient to any risks. For this reason it has been claimed that the use of the bronchoscope is contra-indicated in a case of aneurysm, or even of suspected aneurysm. He has examined eight such cases with the bronchoscope, in which the diagnosis of aneurysm or extra-bronchial tumor was made—sometimes with the bronchoscope first, sometimes the diagnosis had already been made. In none of these cases had he met with any accident, but the patients all submitted readily to the examination with the bronchoscope and did not struggle or resist. In all these instances, however, he took great care not to pass the bronchoscope beyond the tumor, not even to advance so far as to touch the tumor with the instrument. This precaution is important.

The appearance of the trachea during the bronchoscopic examination is characteristic and is easily recognized. When lumen-presentation is brought about, the condition, however, must be distinguished from other bronchoscopic appearances due to bending of the trachea or a branching when the growth is in the bronchi. In one of these cases of particular interest, the patient had the paralysis on the right side, and the physical signs and symptoms of a large growth involving the right chest, which was also shown by the radiograph. The bronchoscopic examination was made under local anesthesia without difficulty, and the tumor, pressing on the right wall of the trachea and compressing the lumen into a crescentic shape, was easily made out. The bronchoscope was kept in position for about fifteen minutes, and was passed without the slightest effort or resistance from the patient, who withstood the manipulations without any mishap. The bronchoscope, however, was not passed beyond the growth. Dr. Yankauer said that incidentally, one reason for his preference for external illumination rather than for the Jackson bronchoscope in spite of the practical advantages of this instrument was the necessity of finding the growth before the bronchoscope reaches it, for in the case of the latter instrument one cannot see until close to the growth, while with external illumination one can see the bifurcations as soon as the vocal cords are passed.

The internist was anxious to get a more detailed examination, so a week later the bronchoscope was passed a second time. On this occasion it was easier than at the first. An effort was made to pass the growth,

but when the narrow part of the trachea was reached it was found impossible to get beyond the growth without a great deal of pressure. No injury was produced nor was there any bleeding or blood stained mucus, and after the operation was over the patient said that it had not bothered him as much as the first time. He got off the table, and would have walked back to the ward, had he been permitted. This was in the afternoon. On the next morning, he suddenly became dyspneic, and in an hour passed away. It was not possible to say whether or not the passage of the bronchoscope had any relation to the death of the patient in this case. The dyspnea began nineteen hours after a bronchoscopy which he had permitted without difficulty. That seemed rather a long time for any reaction to begin, and a patient with a large tumor involving practically all of the chest on one side is apt to die in that way, and it is possible that the death was a coincidence. Unfortunately there was no autopsy and the cause of death could not be ascertained. It certainly was unfortunate that although he had examined so many patients by the aid of the bronchoscope without mishap as long as he kept on the near side of the growth, the patient should have died the first time he tried to pass the bronchoscope beyond the growth. All of the cases which he had seen were examined under local anesthesia. One of those referred to by Dr. Gleitsmann was examined in his office. In that case the aneurysm was not large and had been overlooked by the internist; subsequently the patient was taken to the hospital and a radiograph was taken, and some slight physical signs were elicited. The diagnosis, however, in that case was made with the bronchoscope first.

In another case of special interest, the growth was on the left side, and pressed upon the left bronchus and not upon the trachea at all.

Examination in these cases can be made safe, if the patient does not resist, and if the bronchoscope is kept away from the growth.

Dr. Gleitsmann said that he was aware of the difficulties of bronchoscopy in cases of aneurysm, and it should be attempted only with the exercise of great care and after much experience. Formerly we were warned against the use of bronchoscopy in such cases, but with proper consideration and attention the bronchoscope can be a great aid in reaching a diagnosis.

He had at first intended to extend his paper to all the affections of the chest, mediastinum, lungs, etc., but had found it necessary to limit himself. They are detected by the bronchoscope and by the effect of pressure against the recurrent nerve.

Removal of Foreign Body From Left Bronchus. Removal of Foreign Body From Esophagus. Removal of Foreign Substance From Both Bronchi. By Dr. Sydney Yankauer.

The first specimen was removed from the left bronchus of a boy of 5 years, who gave the following history: For four weeks he had had a cough with profuse expectoration and intermittent fever. Examination showed physical signs of consolidation and effusion on the left side; he had an evening temperature of 104°. He remained in the hospital for a week, during which time the acute symptoms disappeared, but the physical signs did not clear up. A radiograph was taken, and showed the presence of a foreign body on the left side, outside of the mammary line.

The parents were sent for, and upon questioning gave the history of the inhalation of a foreign body some five weeks previously. They had sent for a doctor, but he thought it had passed down into the stomach, and they had given the matter no further attention. This was the second case in which a foreign body was discovered without any previous history. In this case it happened that the substance was of a nature to give a dense shadow; in the other case it was a soft bone and gave no shadow.

On passing the bronchoscope, the left bronchus was found filled with granulation tissue. After removing this a good deal of pus was expelled and the foreign body was seen and removed. The boy made a good recovery in about a week.

The second case had a somewhat similar history. The child was 2 years of age and was eating walnuts; she ran across the floor and fell, and began to cough, and became cyanotic. A doctor was sent for, who thought she was suffering from diphtheria and gave her antitoxin. The cyanosis disappeared, but the attacks of coughing continued, and the cyanosis returned several times a day. After two weeks these attacks became so bad that the cyanosis was accompanied by convulsions. A laryngologist was then consulted, who referred the case to Dr. Yankauer The patient was anesthetized and a bronchoscopic tube passed, but the trachea was so swollen that it was difficult to pass even a small tube However, this was eventually successful, and several small pieces of walnut meat were found and removed. From previous cases of this kind it was suspected that there might be other pieces which had escaped observation. The examination was difficult as there was a great deal of swelling, but eventually with the aid of cocain and adrenalin the left bronchus was entered, and several more pieces of the walnut meat were removed. A careful exploration was made and the bronchus was thoroughly cleaned out, and the child made a good recovery.

While eating chicken the third patient suddenly felt something solid in his mouth, which slipped down his throat. He immediately began to gag and vomit. He went outside and while bending over a basin, his false teeth dropped out and disappeared. Eventually as he thought, the piece of bone went lower down in his throat and remained there. He had a good deal of pain and was unable to swallow. In brief, the history was that of swallowing a piece of bone while eating. On introducing an esophagoscope to a distance of fourteen inches from the teeth, a glistening white body was found. This was grasped with the forceps and withdrawn with the esophagoscope as far as the cricoid, when it slipped back. The esophagoscope was again introduced and the same thing occurred a second and a third time. Finally, the foreign body was seized by the flattened portion and brought up to the cricoid region, but even then it could not be brought out. By holding it firmly but with gentle traction against the contracted muscle the spasm was overcome and the foreign body removed. It proved to be a part of the tooth place, which had evidently been cracked off while he was eating. Following the operation there was a slight abrasion of the posterior esophageal wall, swelling of both arytenoids and marked dysphagia. The patient was put to bed for twenty-four hours, after which the pain and swelling disappeared and he went home.

Regular Meeting, December 23, 1912.

Case of Nose Made Out of Finger. DR. CLARENCE MCWILLIAMS.

The patient, a man of 45, was admitted to the hospital on September 5, 1912. Two years prior he had been a stationary engine oiler. His right arm was caught in the belt and his face was drawn in so that the spokes of the wheel struck his face, annihilating the nose. He was then in a Long Island city hospital for twelve months, where he said he had had eleven operations. On admission to the Presbyterian Hospital, his face was entirely healed but terribly disfigured. It was marred by numerous scars, as was also the forehead, the skin of the forehead being attached to the bone by the scars. The projection of the nose was entirely gone, the nasal and cartilaginous portions being entirely missing, as was also the projection of the frontal bone forward. There was one small opening into the nasal cavity, admitting a probe. The left nostril was entirely gone, and its edge was attached to the bone beneath, while one-half of the right nostril remained and projected forward in a teat-like process. The defect in soft parts went up to within an inch of the frontal bone, and was one inch in transverse diameter and an inch and a half vertically. Any operation to reproduce the nose in such a case must introduce some bony support. Morestin has carried out a procedure of grafting a rib into the soft parts of the forehead and then turning down a flap containing the implanted rib to form the nose. This did not seem advisable because of the scars on the forehead and the wish not to increase his disfigurement by additional scars. There was nothing to be done but to graft a finger into the defect, because the man's condition was pitiable. He could get no position because of the deformity, and went around with a handkerchief tied about his face to hide his disfigurement.

The procedure followed was that described by Finney and McGraw. The head and shoulders were immobilized in a plaster of Paris splint the evening before the operation, and this splint was cut down on one side so that it could be quickly removed in the case of any accident during anesthesia. This splint was of great assistance in later immobilizing the attached hand and arm immediately after the operation. A knife inserted in the defect separated the soft parts from the bone beneath, extending up to the frontal bone, and the edges of the defect were pared all about the margin. The left finger was chosen. Esmarch about one arm; nail removed and scraped, exposing bone beneath. Metacarpophalangeal articulation opened by a posterior longitudinal incision; joint opened; head of metacarpal bone removed; division of anterior tendons, also lateral ligaments of joint. Finger was then free but united by soft parts, and nourished by uninjured digital vessels. Skin removed from whole circumference of last phalanx and tip of phalanx nipped off with rongeur. Finger then slipped into place, the extremity of the last phalanx going up to the frontal bone under a bridge of undivided soft parts. No suture was used to attach the phalanx to the frontal bone. A longitudinal denudation was made on each side of the second phalanx, about a quarter of an inch wide, to which the edge of the cheek on one side was sutured, and on the other that of the nostril, the defect between the check and nostril being filled in by the skin of back of finger. The

first phalanx was left unattached, as it was later to be turned backwards. Interrupted silkworm-gut sutures were used. Plaster of Paris splint was then applied about head and about arm and chest. For a couple of days after the operation the pain in the arm was severe, but after that the arm went, so to speak, to sleep and there was no further discomfort.

On the fifteenth day after this operation, one of the digital vessels on one side of the finger was tied under novocain 4 per cent anesthesia; on the twenty-first day the finger was amputated through the metacarpophalangeal articulation, using novocain locally. No attempt was made to close the proximal end of the finger at this time. Heat in the shape of hot cloths was applied to the finger for twenty-four hours. Subsequently there was some necrosis of the soft parts on the end of the first phalanx, but not to any great extent.

Eight days later, the first phalanx was flexed to a right angle in relation to the second phalanx, and its tip was sutured in this position to the bone behind, while the soft parts covering it were also turned backward and sewed to the freshened lower border of the nasal defect. Sixteen days later it was necessary to remove the greater part of the first phalanx because of the necrosis. After this operation there was some infection of the finger, the pus from which escaped through several places in the line of the scars. This infection, however, soon ceased. The tendons of the transplanted finger were not disturbed at any time during the various procedures, and are still in place.

The man is not yet a beauty, but his appearance is vastly improved. There is no sign now, after three months, of any re-growth of the nail. There is a small opening into the nasal cavity but not sufficient for respiration. He is a mouth breather. He has very little sense of smell. The wound caused by amputating the finger healed by primary union. The tip of the last phalanx seems to be solidly united to the frontal bone. During the twenty-one days that the finger remained attached to the face and hand, nourishment was entirely fluid, and was administered through a tube passed into the angle of the mouth. At the outset of the operation it was planned to wait but fourteen days before amputating the finger, but on the expiration of that time the patient was so comfortable that it was deemed safer to wait another week.

Dr. McWilliams asked the opinion of the members as to the advisability of attempting to improve the smelling function of the nose.

DISCUSSION.

Dr. Carter said that before deciding upon what operation is to be done in these cases—whether a finger is to be used, or bone first grafted into the skin of the arm and then transferred to the face later, as he himself had done in a case previously reported before the Section—the personal equation has to be considered. A great deal depends upon how much the man needs his finger. The loss of so useful a member is a serious drawback to the operation. There were several points, however, in this case in favor of the operation done by Dr. McWilliams, which should not be overlooked. It is a great deal easier to immobilize the hand on the face than to immobilize the arm in that position, for the elbow has to be protruded some distance beyond the head, and it is very difficult to put on a bandage that will hold it steady. Another point, too, is that the skin

on the finger is nearer the color of the skin on the face than that of the arm. This is not due entirely to the fact that the skin on the finger is covered up most of the time and so is whiter, but it is of a different texture and its supply of blood is not so great as that over the face.

In doing the Carter operation, it must be remembered that the contraction of the flap that is taken from the arm is very considerable, and due allowance must be made; the flap should be made twice as large as is needed, owing to this contraction. There are serious objections to the finger method. It is quite a disadvantage to have to remove a finger; hardly anything would overcome that objection in a man who has to earn his living by manual labor. Further, if the nail is not completely destroyed, it would interfere with the permanent result. It is unfortunate that the man has no nasal breathing space, as this would add greatly to his comfort.

Dr. Carter said that he would like to know whether the patient has any sensation in his nose. He said that his own case, where he first transplanted the rib into the arm and then transferred the tissue to the face, was one where there was no nose at all, and that the woman has a nasal breathing space and sensation in her new nose; his case is of ten months' standing. Dr. Carter considers his own operation preferable to that of utilizing a finger.

Dr. Freudenthal said that he could not comment upon the operation itself, for he had had no experience in such cases, but in regard to the question of forming new nostrils he hardly thought he would advise trying that, as it would be impossible to give the man a satisfactory breathing nose. The mucous membrane could not be replaced, and without that he could not breathe satisfactorily; he would be in the same position as a man with atrophic rhinitis. The air would simply pass through, but it would not be assimilated.

Dr. Smith said that Dr. McWilliams deserved the highest commendations for obtaining such an excellent result. Those who had tried such work in the past had signally failed. Some years ago a prominent surgeon had attempted a similar operation, using the thumb, and suit was brought against him for the hideous outcome of the attempt. Looking at the pictures of the case before operation and the condition after, there was nothing but commendation to be expressed for such a wonderful piece of plastic surgery. Only those who had seen other attempts made to do such work could appreciate this case. Personally, he would prefer to attempt rib transplantation in order to save the finger, but it might have failed in this case, as there was no support for the rib, and so much tissue would have had to be transplanted that it seemed doubtful whether as good a result could have been obtained. The distal phalanx represents the columnar cartilage of the nose, and upholds the tip, while the piece of rib would have been perfectly flat.

Dr. McWilliams, closing the discussion, said that there was no sensation in the nose, though there might be some later on. In considering just what to do in this case, the finger method seemed the best, partly for the reason mentioned by Dr. Smith, i. e., the flatness of the anteroposterior diameter of the rib would have been very small and the nose would not have been projected anteriorly far enough. In the next such

case he might try the rib first, and then use the finger as a last resort, if necessary.

Peri-tonsilar Abscess; Nitrous Oxid Inhalation; Death. DR. ERNEST V. HUBBARD.

DR. HUBBARD said that it is always a pleasure to report successes, but that once in awhile it was good for the soul to report a failure. He told of a patient whom he had seen last spring, a man, 31 years of age. He was first seen three years ago suffering from a peri-tonsilar abscess, from which he recovered. Subsequently he had two others which were lanced and from which he recovered in the same way. This last time, however, an attempt was made to lance the abscess, but without success; at the end of twenty-four hours, another attempt was made, again without success, and finally a third futile effort was made. Cocain was used in each instance, but no pus was found. The man's constitutional condition grew worse, his temperature was 104°, and something had to be done. An anesthetist was accordingly summoned, with the idea of operating under nitrous oxide. The anesthetist was one of the ablest men in the city. Only a moment or two before the operation the man had left his bed and gone to the toilet. Everything was made ready, and Dr. Hubbard was busy for a moment with his back turned, when the anesthetist called to him that the man was dead. He had had only two whiffs of the ether, when his heart and respiration stopped, and he was off in a flash. Every effort was made to revive him, using all the usual means for a space of two hours, but all to no avail.

As far as could be determined, the man was in reasonably good health previous to this trouble, his heart, lungs, and kidneys were in good condition. Death did not seem due to fright, for the man had been through a great deal, and did not seem to be affected with fright.

Everyone knows how trying these cases are, but the doctor said that he would never again administer nitrous oxid in a case of peri-tonsilar abscess.

DISCUSSION.

DR. HELLER told of a somewhat parallel case to which he had been called. An able dentist, who had administered nitrous oxid a great many times, had telephoned him to come to the office, and when he arrived the patient was dead in the chair. The man had been treated by a general practitioner for a swelling in his throat. This physician first thought of peri-tonsillar abscess, and incised it several times, but finding no pus present, and observing that the swelling was very far anteriorly, sent the man to a dentist. The dentist made a diagnosis of some infection around the root of the wisdom tooth, and advised extraction of the tooth. The physician told him to go ahead, and upon being asked about the anesthetic, he consented. The anesthetic was given and the tooth extracted, and as the dentist turned to lay the tooth down and then looked back at the patient, the man died. The family physician was summoned immediately, but the man was already dead. The dentist said that he could not feel that it was due to the extraction of the tooth, for there was no difficulty. No explanation could be reached, excepting that in some way the man had been infected. There was pus at the root of the tooth.

Whether there was an infection, causing a heart depression, could not be determined.

DR. FREUDENTHAL said that it would seem almost impossible that in such a case the patient should die from infection. A man could not die from an infection in a few seconds; but he might die from asphyxiation. He had had cases where the pus from the pharynx went down into the larynx, causing asphyxiation in a very short time.

DR. SEYMOUR OPPENHEIMER said that the case referred to by Dr. White and the one referred to by Dr. Heller were entirely dissimilar, in so far as in the one no operative interference had been employed before the death of the patient and in the other death occurred after or during the operation. He questions very much the judgment or wisdom in employing general anesthesia for the evacuation of any pus focus about the throat. The danger of aspiration of the contents of the abscess cavity when opened is a very serious one. Death occurs in these cases from asphyxiation.

DR. CARTER said that it would seem that Dr. Freudenthal had struck the nail on the head in stating that death was probably due to asphyxiation resulting from the anesthesia. Of course, where there is a large collection of pus anywhere near the entrance to the lungs, the natural passage is already constricted, and this constriction is increased by the nitrous oxid; for the vessels of the head especially become turgescent in any operation under this anesthetic. Dr. Carter believes that a certain amount of asphyxiation always occurs under nitrous oxid anesthesia.

DR. SMITH agreed with Dr. Oppenheimer in what he had said relative to general anesthesia in these cases. The air is insufficiently areated any way owing to the obstruction in breathing, even previous to the administration of an anesthetic, and when an anesthetic is administered the individual is unable to throw out the pus that accumulates in the larynx and trachea, consequently it is aspirated. It was a standing rule in his clinic that no patient with an abscess in or around the upper respiratory tract should have general anesthesia for its evacuation. From the innumberable evidences given of fatal cases following anesthesia for the evacuation of pus in and around the upper respiratory tract it seems conclusive that it should be forbidden.

DR. JOSEPH E. LUMBARD agreed with Dr. Smith that a general anesthetic was dangerous in any collection of pus in the throat. One or two precautions should always be taken; a prop should be placed in the mouth, as it is very difficult to get the mouth open when using nitrous oxid. The less general anesthesia given in these cases the better. Another important point is to have the head of the patient with the face downward, or the head very much lowered.

He asked if any of the gentlemen knew whether in any of these cases reported the gas had been turned with the positive pressure. That makes a great deal of difference, especially with a young subject. Some one had said that a patient anesthetized with nitrous oxid gas must be cyanosed. That is not correct.

DR. HURD told of a case of peri-tonsillar abscess which he had seen two years before, located behind the tonsil and extending down the lateral pharyngeal wall nearly to the level of the larynx. Examination of the larynx with the mirror revealed no edema around the arytenoids or else-

where. The patient was in good shape and walked to the operating room. The mouth was opened, the swelling incised with a knife, and then with the finger the incision was enlarged downward; all in about five seconds. The man after that walked back to his room, said he felt much better and was greatly relieved, and I went out of the hospital. Ten minutes later he was dead. He must have died of acute edema of the larynx. In these cases general anesthesia seems usually contra-indicated. Hyoscin and morphin with local anesthetics are much preferable, and the patients will have to stand some pain. Some of them will die quickly, whether anesthesia is used or not.

DR. MCWILLIAMS said that as he had listened to the various cases just reported, it seemed to him that the last death was due to an embolism and not asphyxia. It takes only two or three minutes for such a patient to die.

DR. HURD said that in the case he had mentioned the death occurred about twenty minutes after the operation.

DR. MCWILLIAMS said that in the cases which he had seen in general surgical practice the patients would sometimes get along for ten or eleven days, when an embolus would break loose and get into a coronary artery or pulmonary vein and the heart stop. He was inclined to think that that was the condition which had caused the death, a pulmonary, coronary, or cerebral embolus.

DR. MCCOY said that one of the facts that stands out most prominently in the literature is that many of these patients die suddenly. He had had much experience in treating this class of cases of suppuration of the lower pharynx, the patients getting along very well apparently for awhile and then suddenly dying. There seems to be a severe infection which produces an effect upon the heart. He was more inclined to believe that it was an affection of the heart produced by extreme sepsis than an acute edema of the larynx, for that would require more than ten minutes, perhaps more than an hour's warning. In one of the meetings of the Section in the spring, a number of cases of this class were reported ending in sudden death. One of the points which would seem to indicate an extreme character of sepsis was that the cases were usually associated with high fever, profuse sweating, and extreme prostration. A general anesthetic would seem to be a bad thing in these cases, and yet cocain, which is a cardiac depressant, seems contra-indicated also. It is best to give a guarded prognosis in all cases occurring in patients over 50 years of age.

DR. HUBBARD said that he was glad that the unfortunate case he had reported had brought out this discussion, for he had learned some things that he had not known before. Replying to the question in regard to pressure, he was inclined to think that the pressure was positive, for the bag was filled but once and the patient had taken but a few whiffs of the anesthetic.

Replying to Dr. Freudenthal's question as to the condition of the patient at the time of death, he was inclined to believe that the man died from heart failure, in spite of the fact that death from nitrous oxid is due to respiratory failure. He agreed with Dr. Carter's remarks about death from heart failure. This man had been very ill and his heart had

probably become much involved. He was white, not red nor bluish, but dead white, before death and after.

In regard to what had been said about the blocking of the throat with the abscess, and whether the operation had been begun—the man had not been touched. The patient was in the hands of the anesthetist, who informed him that the man was dead. His throat was not blocked, and his breathing was not interfered with. His general condition was good, and the local condition was simply the swelling in the throat after three incisions.

Paper and Demonstration of Suspension Laryngoscopy. DR. WOLFF FREUDENTHAL.

DR. WOLFF FREUDENTHAL described this novel way of rendering the larynx more accessible to our vision and instruments and said: The instrumentarium necessary for this new invention of Killian's consists of an operating table, a stand or gallows, a hook-spatula with a handle, a tongue holder and a mouth-gag, and finally for illumination a Kirstein head-light. After giving the details of each instrument used, the position of the patient and the mode of introducing the instruments, Dr. Freudenthal continues: After the adjustment of the apparatus is completed the view obtained is excellent. We see at once the interior of the larynx, more so naturally the posterior commissure; we see part of the trachea, the sinus pyriformis, the pharynx and occasionally the upper portion of the esophagus. At the same time we have both hands free for operation and the larynx is absolutely open to us, i. e., there is no hook nor tube in it to encroach upon its lumen.

In order to remove certain diseased areas from the interior of the larynx, we simply resort to a double straight curette, or any other suitable straight instrument, and this can be done as quickly or more quickly than I can put this in writing. I have done this repeatedly. At other times it is more difficult, but it is always easier than with the old method.

There are several advantages connected with the method. We see parts which could not be seen otherwise, as for example the anterior portion of the posterior laryngeal wall. Other parts, as neoplasms for example, assume a different aspect. It is easier for the patient and the physician to operate in this way.

Dr. Freudenthal has operated on a number of different cases and of late has used that method for the removal of submerged tonsils. The doctor considers it a valuable contribution to our laryngological technic and is convinced that it will bear good fruit in the future.

DISCUSSION.

DR. FELIX COHN said that he could endorse the statements of Dr. Freudenthal. He had had the occasion to use the suspension apparatus simultaneously with Dr. Freudenthal at the Beth-Israel Hospital, and also at the German Hospital with an apparatus placed at his disposal through the courtesy of Dr. Max Heiman, who had brought the apparatus with him from Europe this fall. How will the suspension be borne, is demonstrated by the fact that the suspension was demonstrated by the speaker a few days ago at the Clinical Society of the German Hospital to about fifty or sixty physicians under local anesthesia. Prof. Killian demonstrated the suspension laryngoscopy to 120 physicians, and one can

readily deduce that the lapse of time required for such a demonstration would suffice, or any operative interference which might be necessary.

Dr. Freudenthal did not refer to one point, to the selection of cases. All cases cannot be suspended or can only be suspended with great difficulty. And the same rules and conditions hold as for an autoscopic or bronchoscopic examination. As a rule those patients that are easily autoscoped are easily suspended. The article of Killian has given the impression that suspension almost necessitates a general anesthetic. The speaker, however, found that the majority of cases can be examined under local anesthesia.

As far as the technic is concerned, the occasional slipping of the epiglottis referred to by Dr. Freudenthal may sometimes be due to a faulty method of introduction, and a little more experience, and occasionally a reintroduction of the spatula will overcome this difficulty without having recourse to methods of holding down the epiglottis by an extra mechanical device. It is beyond a question, that suspension laryngoscopy has come to stay as a permanent and valuable aid to the laryngologist, and that the apparatus will shortly become a part of the equipment of every hospital. In some cases one cannot only see the larynx and trachea, but even the bifurcation and the opening to both bronchi; it would therefore be possible to remove growths or foreign bodies from the trachea or even the mouth of the bronchus, without the use of a bronchoscope.

Dr. Smith asked Dr. Freudenthal whether the bronchoscope could be used as easily through this method as through the former method; and whether in fulguration of papilloma of the larynx there was any more danger of short circuit with this spatula than with that commonly used; also what advantage there was in esophagoscopy. He also wished to know what advantage was obtained in operating on adenoids and tonsils in this position over the ordinary method. There was very little danger in aspirating blood in the ordinary recurrent position, and to have all this apparatus in the way seemed unnecessary. Under the ordinary methods this operation is done so rapidly that the aspiration of blood does not enter as a dangerous factor. He also asked if there was any danger of paralysis or stiffness of the neck or other undesirable sequellae from this method.

Dr. Einhorn said that he had been present at the Clinical Society of the German Hospital when Dr. Felix Cohn had demonstrated this method of direct inspection of the larynx on a patient, and had looked into the larynx and trachea, and saw the vocal cords and the rings of the trachea. He had been so impressed with the advantages of this method that he had no doubt it would soon become popular. It was very simple, and one could see things just as they are, without using mirrors, and have the whole field in view. As to esophagoscopy, it might be of advantage to use this method in some cases, but the old method was not difficult. Very little time was required. As soon as the patient is in position the operation can be done very quickly, and the evil results of any pressure could not be great.

Dr. Cohn said that with the apparatus one could not only see the trachea, but could see the bifurcation and could look right into the bronchus, and that it was possible that foreign bodies in the trachea or bron-

chus could be removed without the use of the bronchoscope. That would certainly be a great advantage in some cases.

DR. CARTER inquired whether, in operations requiring an anesthetic, the anesthetic was administered before the apparatus was placed in the mouth, and also whether the patient's breathing was in any way interfered with while the apparatus was in position.

DR. HELLER asked what method of lighting was used.

DR. MCCOY said that one great advantage of this method was that the patient's head was held firm and steady for the operator without his having to depend upon an assistant, whose strength might give way just when the steadiness was most needed. Otherwise, he could see but little advantage in this method over Jackson's and others that had been described. One can see just as well and manipulate just as well. He had never experienced any difficulty in getting the instrument in and seeing the larynx perfectly. He could not quite understand how Dr. Freudenthal managed the epiglottis.

DR. FREUDENTHAL said that there were several points which he had omitted to mention in his introductory remarks, as he had not wished to make the paper too long.

In regard to the selection of cases, Dr. Cohen was perfectly right; some cases are easier to examine than others. A man with a stiff neck or a rigid jaw would be very difficult to examine in this way. Dr Cohen had spoken of two apparatus which are in the city. He himself had known only of this one kind which he had imported.

Dr. Smith had asked several questions, some of which had been answered in the discussion. One can see a great distance into the trachea, the bifurcation, etc., and one can operate on all these parts directly. The speaker had not used the bronchoscope in connection with this method, but intended to try it some time. He had not used the short circuit with the apparatus.

Replying to the question of lighting: In the demonstrations he had used the Kirstein head-light; small lamps can be attached, however, and the light thrown in directly.

One advantage over the older methods was that in no case was the blood in the way. Some tonsils bleed quite a good deal. The patients complain very slightly of stiffness or other unpleasant features. The tongue is not injured at all.

Replying to Dr. Carter's question about anesthesia: The anesthesia is administered before starting in, in order not to keep the mouth of the patient open too long. The apparatus does not interfere with the breathing at all.

Replying to Dr. McCoy: The instrument presses the tongue upward and the upper jaw is pressed downward. There is a wide space open generally. It is easy to see when the tongue has slipped or will slip, and the instrument can be taken out and re-adjusted so as to hold the tongue flat. It is probable that the instrument will be slightly improved.

DR. GLOGAU reported that the patient with hysterical aphonia, presented at the previous meeting of the Society, had been treated with the high frequency current and had regained her voice.

THE PHILADELPHIA LARYNGOLOGICAL SOCIETY.

Regular Meeting, October 29, 1912.

DR. ROSS HALL SKILLERN, CHAIRMAN.

Apparatus for Illuminating the Accessory Sinuses of the Nose. DR. E. B. GLEASON.

The little apparatus, in fact a vest-pocket edition, is very simple in its construction and is inexpensive. It consists of an ordinary "ever ready battery" obtained at the hardware shop. The incandescent lamp is detached and in its place is attached a long tube containing ordinary lamp. It was demonstrated that the frontal sinus could be thoroughly illuminated; the maxillary sinus could not be seen as well, however, as the frontal. There is also an attachment to be placed in the ordinary mirror for examination of the larynx and naso-pharynx.

Resection of the Ascending Process of the Superior Maxilla in a Case of Naso-pharyngeal Fibroma. Death Immediately Following the Operation. DR. ROSS HALL SKILLERN.

H. B., aged 14 years, was brought to me in consultation as a case of sarcoma of the inferior maxillary. Examination showed the left nares completely occluded by a granulating mass which bled profusely on the slightest manipulation with the sound. A copious, slightly fetid serosanguineous discharge was also present on the affected side. In the naso-pharynx a large smooth rounded mass hung down to the lower edge of the palatal folds, completely occluding the entire choanae. This condition had been present for more than a year, but in the last few weeks had become greatly augmented. Previous treatment had consisted in cauterization of the nasal portion which almost protruded from the nares. In all perhaps a dozen cauterizations were made. The profuse hemorrhages which followed these applications caused his physician to make the diagnosis sarcoma.

Present condition: Thin anemic boy. Asymmetry of face. Typical mouth breather. All upper teeth had become loose and fallen out. I advised immediate operation which the attending physician endorsed and was agreed to by the family. The patient was placed in the hospital and carefully prepared for operation on the following day.

Operation: Morphia, 1/6 gr. and atropia 1/200 gr. was administered hyperdermatically. An incision was made from the internal angle of the eye along the side of the nose to the median line below the left nostril. The hemorrhage was free but not profuse. After elevating the periosteum to the pyriform aperture and over the antrum a portion of the ascending process of the superior maxilla was resected until the mucosa of the nose was bared. The maxiliary sinus was filled with a gelatinous substance in all probability a mucocele. The bone in this region was necrosed, apparently from pressure, as no sign of sarcomatous involvement was to be found. After incising the nasal mucosa the true nature of the tumor was apparent, as a large glistening white mass occupied the entire nasal chamber pushing the septum toward the opposite side but apparently

lying free in the cavity, as no attachment could be found anteriorly. On passing the finger backward dense adhesions were felt in the spheno-ethmoidal region laterally. The index-finger of the other hand was inserted into the choana and it was noted that the attachment extended along the inferior surface of the body of the sphenoid. The patient's condition up to this time had been very good, heart 130 and breathing normal, no blood having escaped into the larynx. Dissection by means of the finger and a periosteal elevator finally loosened the attachment of the tumor, and it was removed entirely through the anterior opening. Considerable hemorrhage immediately followed the removal, but it was soon controlled by tampons. As we were about to insert the packing and suture the patient suddenly ceased breathing. He was quickly turned on the side, a mouth-gag inserted and the throat swabbed out, although he had not once coughed nor was cyanosis marked. Only faint spasmodic efforts to breathe were made, showing that the respiratory inhibition was central rather than peripheral. The heart was weaker, although regular and not accelerated. Hyperdermatics of atrophin and whiskey were given, and the sphincter was dilated but without influencing the respiration. A quick tracheotomy was performed and the trachea wiped out as far as the bifurcation; some clotted blood appeared on the gauze. Artificial respiration and oxygen were continued and although the lungs would not act automatically, nevertheless the heart continued even stronger than previously. No sign of cyanosis was present, the patient being pale. Artificial respiration was continued for about 50 minutes when the heart suddenly ceased to act. Critically reviewing this case, it is a difficult matter to arrive at the precise cause of death.

The preparation of the patient was faultless, the ether administered by an expert anesthetist (Dr. H. M. Goddard), and although the operation lasted nearly one hour and three quarters a trifle more than one can (¼ lb.) was used. No undue traumatism was caused in removing the growth and as far as we could judge by feeling it had not penetrated into the cranial cavity. The hemorrhage, while at times profuse was always quickly controlled. Considering these facts it was decided by those present (Dr. Geo. M. Coates and Dr. William Menah) that death was due to paralysis of the respiratory center from the hyperdermatic of morphia administered previous to the operation. This may have been furthered by the small amount of inspired blood together with the lack of oxygen the patient received while manipulations were being made in the choanae. There was no question that the reflexes were abolished at that time for not once did the patient cough or show any signs of strangulation. An autopsy might have thrown some light upon this question but unfortunately one was not permitted.

A Case of Myiosis Aurium Accompanying the Radical Mastoid Operation.

DR. GEO. M. COATES.

The following case is thought to be of sufficient interest to justify a brief report: L. H., 14 years old, is a student in the Pennsylvania Institution for the Blind in Philadelphia. When 4½ years old, following scarlet fever, he lost sight of both eyes and developed a chronic suppurative otitis media which in time destroyed the hearing of his right ear and so impaired that of the left that the loud spoken voice could only be

heard at a few inches distance. He has been under my care for the last five years, during which time the discharge of pus has not materially decreased, for during vacation time in summer he is accustomed to go to his home in the country where he gets no treatment at all, and so loses what little improvement he has made during the winter.

A radical mastoid operation was proposed several times, although not urged on account of his blindness and the very little hearing-power remaining. It was always refused until this summer when symptoms of cholesteatoma became marked and consent to the operation was finally obtained. At the time of operation, which was done in the Pennsylvania Hospital, the mastoid process was found to be extensively excavated and a sinus had opened from the cavity of the antrum into the posterior wall of the external canal. Ossicles and tympanic membrane had long since disappeared and a thorough and careful, complete radical operation was done. The posterior incision was closed completely and the cavity packed through the meatus with plain sterile gauze. Aseptic technic was careful and painstaking throughout. As the boy made a good recovery from the ether and had a normal temperature, the packing was not removed until the third day. On removing this packing a very bad stench was apparent and some forty or fifty small maggots came away with the gauze or were washed out immediately afterwards. The ear was this time packed with iodoform gauze which was changed daily for a week and then omitted altogether and no more larvae were seen, the patient making an unevently recovery.

The patient had spent the summer on a farm and entered the hospital on Thursday, August 22, 1912, being operated upon on Friday, so that I had not seen him personally since the preceding June, until the day of operation.

The ear had been douched in the ward without any larvae being discovered. The eggs must certainly have been in the middle ear at the time of operation, having been deposited by the fly while he was in the country, and in spite of what seemed a thorough operation a large number of them remained to develop into the maggots. Where they could have been I am at a loss to know unless in the Eustachian tube and dislodged upward by the curetting, which was almost the last step of the operation before the ear was packed.

DISCUSSION.

DR. GLEASON: Larvae of domestic fly are often found in strange localities. I have seen living maggots in a normal auditory canal.

DR. LEVY B. HIRST: Maggots were found in a patient's ear the day following an outing in the country. He had taken a nap on the grass.

DR. SKILLERN: Do flies give birth to living larvae? He once saw maggots protruding from the belly of a fly.

DR. COATES: In answer to Dr. Skillern's question. There is the viviparous and ovaparous variety of fly, the former giving birth to living larvae, and the latter depositing the eggs in putrid material, which on the hatching of the eggs in a few hours sustains the young larvae. The Texis screw worm fly, or lucillia macillaria, belongs to the latter variety and according to the Bureau of Entomology, Department of Agriculture, was probably the cause of this case of myiosis.